34th Year JANUARY, 1951

RUBBER AGE

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AND

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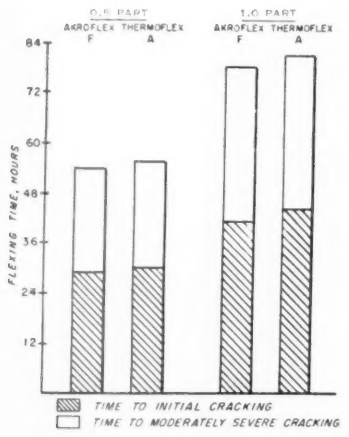
Production Capacity for Manufacturing these two Favorites has been Greatly Increased

R. T. VANDERBILT CO. INC.

230 Park Avenue, New York 17, N. Y.

FOR MAXIMUM PROTECTION at minimum cost use . . . . . Du Pont . . AKROFLEX F*

the new, flex-resisting antioxidant



With efficient, economical Du Pont Akroflex F you can obtain maximum protection against flex-cracking at minimum cost. The protective value of Akroflex F is essentially equal to that of Thermoflex A, long the standard of excellence among flex-resisting antioxidants. *Yet, Akroflex F costs one-third less than Thermoflex A.*

The bar graph shows the results of tests comparing the effectiveness of Akroflex F with that of Thermoflex A in a natural rubber tread compound. For practical purposes, the two antioxidants are equal. And results of road tests of 8.20 x 15 tires with "half and half" treads have confirmed that there is little or no difference between the two materials.

Remember, too, that Akroflex F is easy to handle in your plant. Its melting point is high enough to prevent caking in storage. Yet, it is low enough to assure excellent dispersion during mixing.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

DU PONT

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Complete information on Akroflex F is available in our Report 50-4. Extra copies are available. For samples, see your Du Pont representative or write E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

*U.S. PATENT 2,406,722

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B. F. Goodrich Chemical Company ***raw materials***

NEW IDEA IN OIL FILTERS

—a re-usable *Hycar* GASKET!

Oil filter by PurOlator Products, Inc., Rahway, N. J.

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For use in parts that must withstand oil, gasoline and other deteriorating fluids, Hycar can be compounded to provide low absorption. Yet, it remains practically unchanged in hardness, elongation and tensile strength even after prolonged exposure.

Excellent resistance to cold flow and compression set are characteristic of Hycar compounds. They exhibit good flex-life and have extreme resistance to oxidation and aging.

What Hycar does for this gasket may give you an idea for improving or developing a product. Any one, or combination of Hycar's advantages—resistance to oil, gas, heat and cold, weather and wear—may be just what you need. We make no finished products—supply raw materials only. But our staff is always ready to help you with technical service. Just write Dept. HA-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, O. Cable address: Goodchemco.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

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GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Process your stock this faster way... make tires and tubes with **Philblack*A!**

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Up . . . up . . . up go production rates.

This easy mixing MAF (Medium Abrasion Furnace) black incorporates rapidly—stocks extrude with breath-taking speed. Surfaces are *sm-o--o-th.* Cross-sections match the die closely without roller coaster variations even at high tubing speeds.

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The Philblack Sales Service Laboratory located in downtown Akron is adequately staffed and equipped to analyze your compounding needs. Avail yourself of this service through the Philblack technical sales representative who calls on you.

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EVANS BUILDING · AKRON 8, OHIO

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Philblack A and Philblack O are manufactured at Borger, Texas.

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The Goodyear Tire & Rubber Company, Inc., Chemical Division, Akron 16, Ohio

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Dow Corning Silicones Mean Business!

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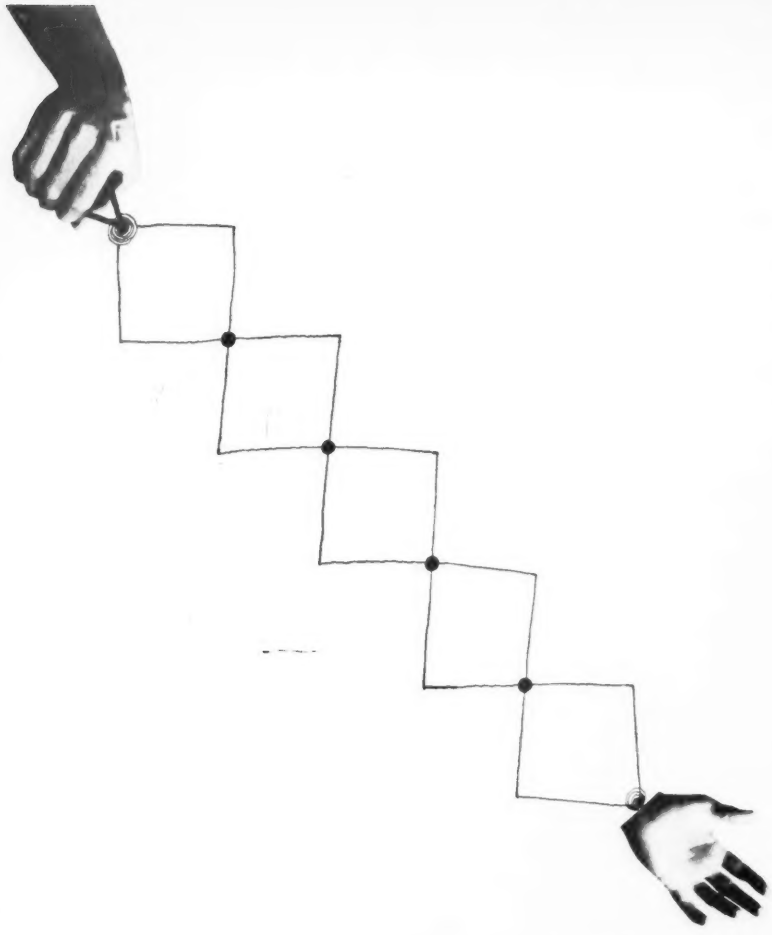

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Sound good? Purecal is good! Purecal M is the only calcium carbonate pure enough to add to synthetic or natural lattices without thickening or gelling. If you'd like to know more write for our booklet, "Purecal in Natural Rubber."

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You can get an ideal balance of anti-oxidation protection and non-discoloration in natural rubber stocks with WING-STAY S—Goodyear's anti-oxidant that combines high protection with low cost.

Your GR-S 26 stocks purchased through the Office of Rubber Reserve have WING-STAY S already incorporated, or you can get this high-grade, low-cost protection for your own natural and synthetic stocks in the quantities you need directly from Goodyear.

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Whether you want an accelerator for surgical gloves or tractor tires, Monsanto's accelerator El Sixty will give you the performance you need.

El Sixty (Di [benzothiazyl thiomethyl] urea) offers these advantages:

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For complete information and experienced assistance in your rubber chemical problems, get in touch with MONSANTO CHEMICAL CO., Rubber Service Department, 920 Brown Street, Akron 11, Ohio.

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Santoflex AW
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ALDEHYDE AMINE ACCELERATORS

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Diphenyl Guanidine (D.P.G.)
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ULTRA ACCELERATORS FOR LATEX, ETC.

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CHEMICALS for PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

an $8,000,000 expansion
program for the production
of ST. JOE lead-free ZINC OXIDES
NOW COMPLETED
AT JOSEPHTOWN, PA., on the south bank of the Ohio River about thirty miles northwest of Pittsburgh, is the electrothermic smelter, which operates as a custom smelter, receiving both domestic and foreign concentrates. Constructed in 1930, the plant was designed to produce zinc oxide and to process 120 tons per day of zinc concentrate obtained mainly from the Company's zinc mines in St. Lawrence County, N.Y. Expansion of the plant and equipment during 1939 and 1940 brought the processing capacity to upwards of 300 tons of concentrate per day. As a result of a postwar expansion program completed in 1950, at a cost of about $8 million, the plant's processing capacity has been doubled.
ST. JOSEPH LEAD COMPANY
250 PARK AVENUE • NEW YORK 17 • ELdorado 5-3200
Plant & Laboratory, Monaca, (Josephtown), Pennsylvania

demand COMMAND performance

Reproduced here, in miniature, is one of our advertisements which appeared in the trade press early in 1950. The completion of our second expansion program announced therein, resulted in a 500% increase in the smelter's processing capacity since the start of operations in 1930.

These successive increases in our production facilities were necessitated, fundamentally, by one single factor: *The consistent high quality of ST. JOE lead-free ZINC OXIDES*. The recognition of this factor by zinc oxide consumers resulted in a steadily growing demand for our product from regular customers, plus the additional tonnages of our zinc oxides required by the constantly increasing number of new customers.

Our book ST. JOE ZINC OXIDES, containing fifty-five pages of technical data, is available to Purchasing Agents and Technologists in the ZnO-consuming industries — with our compliments.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK 17 • ELdorado 5-3200

Plant & Laboratory, Monaca, (Josephtown), Pennsylvania

ASK ANYONE WHO KNOWS...

R. D. Wood 570-ton self-contained press for general use in molding rubber or plastic products, or for laboratory service.

R. D. Wood 3400-ton two-opening steam platen press for vulcanizing and curing rubber composition sheet packing, floor tile, and rubber belting.

You get from an R. D. Wood hydraulic press *engineered performance*—year after year!

You get this proved performance because R. D. Wood hydraulic presses are very carefully designed and built—with only the finest materials used in their construction.

You get this performance—with all its obvious economies—because 150 years of manufacturing experience go into each piece of R. D. Wood equipment.

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EST. 1803

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. . . in spite of military demands!

Has the shortage of new rubber got you up a tree? Have government restrictions and the ever-changing prices of crude made it well nigh impossible to maintain your production standards? Then take a tip from the nation's top battery producers and ALWAYS . . wartime or peacetime, keep a substantial percentage of reclaimed rubber in your formulae. Battery builders learned that important lesson years ago and now use U. S. Reclaims in all their products to STABILIZE their quality, their production and their costs. Plus all that . . they know that reclaim in their formulae means faster mixing and easier processing.

Whether you make battery boxes, tires, footwear, mechanicals, plumbing specialties or any one of hundreds of different items, there is probably a U. S. Reclaim that will STABILIZE your product and MAKE YOUR NEW RUBBER GO FARTHER.

Always keep reclaims in your formula and always look to U. S. for the best. U. S. Rubber Reclaiming Company, Inc., P. O. Box 365, Buffalo 5, N. Y.

Trenton agent: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

68 years serving the industry solely as reclaimers

U.S. RUBBER RECLAIMING COMPANY, INC.

A high purity *coagulant* especially manufactured for compounders of latex products...

Photo Courtesy American Airdle, Inc., Akron, Ohio

Baker CALCIUM NITRATE

The dependable uniformity and high quality of Baker's Calcium Nitrate gives it an ever-widening appeal to the rubber industry.

Especially manufactured for use by latex compounders, Baker's Calcium Nitrate has the exceptionally high purity demanded in a coagulant. It has superior wetting qualities . . . does not harden in the barrels, and remains in workable condition . . . gives more uniform results, with less trouble in process work.

This product is a technical crystal ranging in size from 1½" to smaller sizes. It is a creamy white color. It contains 4 molecules of water of crystallization.

Baker's Calcium Nitrate helps reduce overall production costs—gives you efficient and economical results! Specify it for your processing.

Baker supplies several other chemicals to the rubber industry—chemicals known for their uniformity and dependability. Whatever your needs, your inquiries for samples and prices are invited. Write to J. T. Baker Chemical Co., *Executive Offices:* Phillipsburg, New Jersey.

6 Baker Chemicals for the Rubber Industry

- CALCIUM NITRATE
- MAGNESIUM OXIDE
- MAGNESIUM CARBONATE
- LEAD ACETATE
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Baker CHEMICAL

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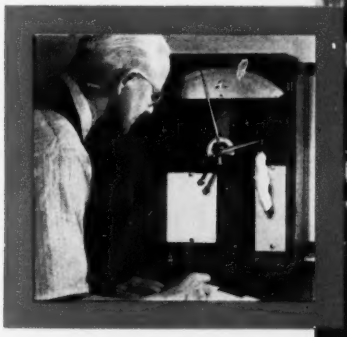
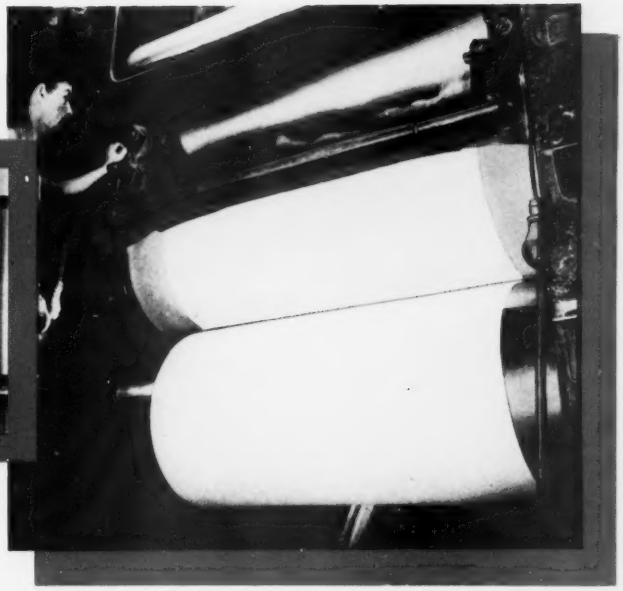
The greater uniformity of Mt. Vernon fabrics means *consistent* quality in your finished products — smoother, more efficient fabrication.





DETERMINING YARN NUMBER WITH SUTER SCALES After Breaking Skein. One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products.

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AT YOUR SERVICE — Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

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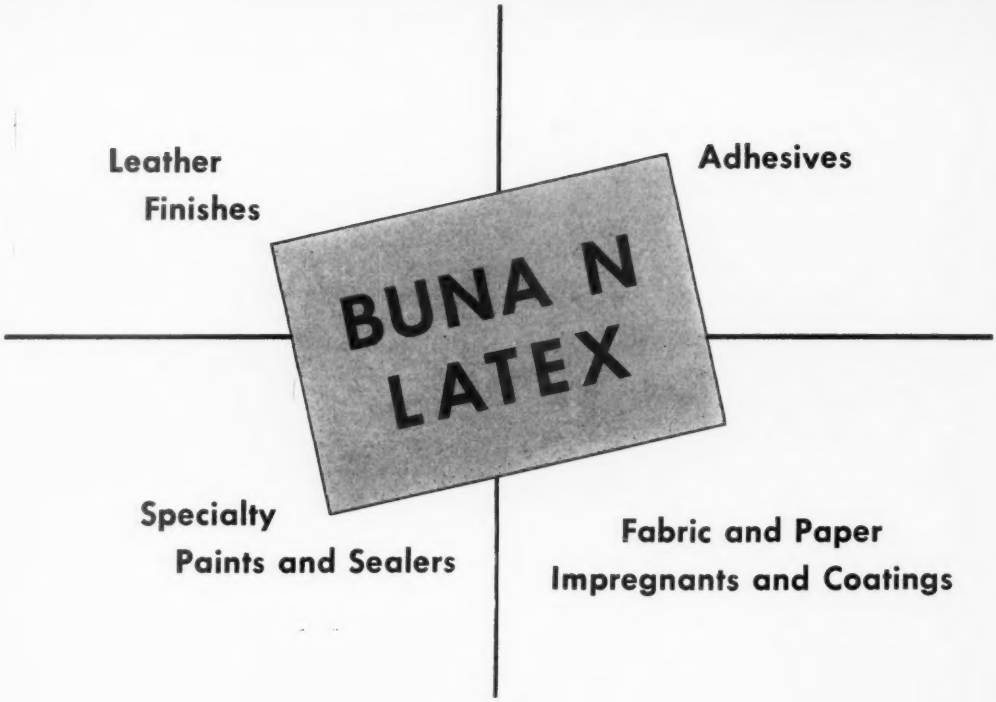

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EXCELLENT STABILITY · VARYING ACRYLONITRILE RATIOS
WIDE RANGE OF SOLIDS · GOOD AGING · LOW MODULUS

Buna N latices are compatible with a wide range of other materials varying from vinyls to phenolics. The principal function of Buna N latex is to make the *end product* resistant to oils, greases and solvents. This feature, combined with the other desirable latex characteristics of Buna N, results in premium materials at moderate cost.

General Latex has available several Buna N latices and can supply them uncompounded, or compounded to emphasize the particular physical properties essential to your product.

Samples and prices on request

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Exclusive Agency for sale of **Harrisons & Crosfield** Malayan Latex in U. S. A.
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UNITED CARBON COMPANY, INC.
CARBON BLACKS

KOSMOBILE 77
EPC

KOSMOBILE HM
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United channel blacks command attention. They are made with the skill acquired through decades of experience in carbon black manufacture. Their handling qualities are a boon to compounders and operators. Their service performance evokes highest satisfaction.

United channel blacks are standards of quality. They are dependable and uniform. For best results, select United blacks.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia

Boots courtesy of U. S. Rubber Company

extend
the
life of white
rubber
with
non-staining

ANTIOXIDANT 2246

No other rubber chemical can equal the performance of ANTIOXIDANT 2246 in extending the life of white and light-colored rubber stocks, with no discoloration resulting.

That's because ANTIOXIDANT 2246 is the most active non-staining, non-discoloring antioxidant ever developed.

Excellent in both natural rubber and GR-S stocks, ANTIOXIDANT 2246 helps retain the original physical properties of rubber, thus extending the service life of rubber products. Write for technical bulletin.

AMERICAN Cyanamid COMPANY

CALCO CHEMICAL DIVISION
INTERMEDIATE & RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY, U.S.A.

Calco®

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby and Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N.J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto

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WHITETEX

● **FINE particle size white pigment. Brightness 90-92. GOOD reinforcing. Excellent *processing*.**

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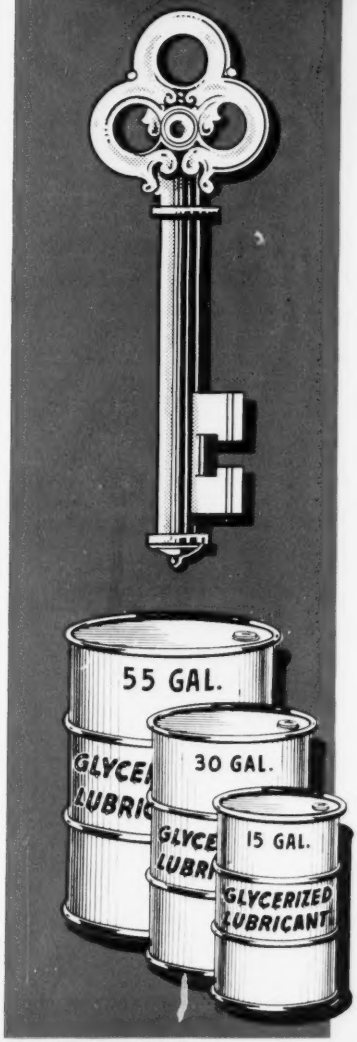
THE KEY TO YOUR RUBBER ADHESION PROBLEMS



GLYCERIZED
(LIQUID CONCENTRATE)
LUBRICANT

Eliminates slab sticking without the dust nuisance of talc, soapstone, whiting or clay. A non-adhesive coating is effected by either dipping, spraying or brushing. Fast drying speeds up operations.

Provides a quick release for molded articles and is equally effective for airbags, mandrels, cores and belt drums. Here, again, stickiness is eliminated which results in higher production.

Extruded material emerges with a more smooth surface and the extruding operation itself is facilitated. The problem of stock sticking in flat pan vulcanization disappears. Stable at vulcanizing temperatures; no decomposition occurs.

Imparts a glossy satin sheen to finished articles, which is retained.

Aids in the processing and handling of insulated wire and cable.

GLYCERIZED LUBRICANT is highly concentrated. Only a 2 to 20% water dilution is required for practically all operations. One gallon makes 5 to 50 gallons of ready-to-use solution. A LITTLE GOES A LONG WAY! Composition is such that it is non-toxic and practically odorless.

Also Mfgrs. of

RUBBEROL — INTERNAL LUBRICANT

SYNTHOL — TACKIFIER & PLASTIFIER

Extrud-O-Lube — EXTRUSION LUBRICANT

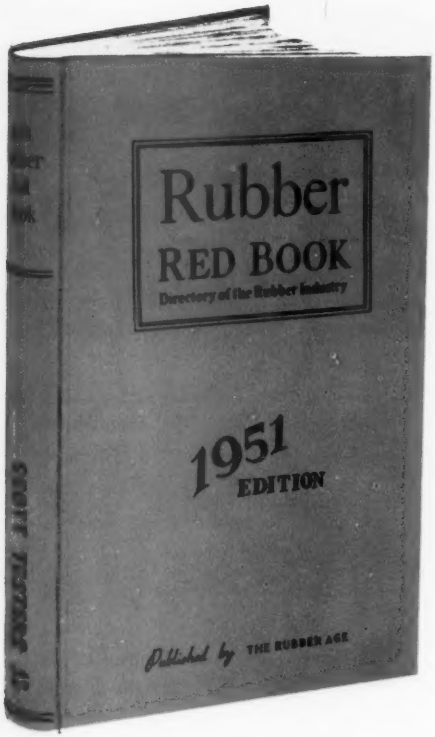
QUALITY SINCE 1884

GENSEKE BROTHERS

RUBBER MATERIALS DIVISION

West 48th Place and Whipple Street — Chicago 32, U.S.A.

Plan Now for Advertising Space in the 1951 RUBBER RED BOOK!



The Eighth issue of the RUBBER RED BOOK—the 1951 edition—is scheduled for publication in April, 1951.

As usual, the forthcoming edition will have various improvements and up-to-the-minute corrections and additions to keep pace with the growth and progress of the rubber industry. This constant improvement in each succeeding edition is the key to the continued acceptance and wide use of the RUBBER RED BOOK by the important men in the rubber field . . . and that's why it is such an outstanding advertising medium for suppliers to the industry.

As proof of this fact we point to the growth in the number of advertisers from 100 in the 1937 edition to 286 in the 1949 issue — and from the interest already shown and the number of advance orders on hand, we feel certain that the number of advertisers in the 1951 issue will exceed 300.

The RUBBER RED BOOK is the most widely used book in the rubber industry. It is the one book which agswers the many questions arising every day in rubber factory operations, and in the words of one of the industry's leading technologists, " . . . is a **must** for anyone working with rubber."

Arrange now to be represented with adequate space in the 1951 edition — it will be just like having your salesman at the purchasing agent's elbow when buying decisions are being made. The cost is low (see rates below) and the results are sure!

PUBLICATION DATE—April 1, 1951

PRICE PER COPY—$7.50 (postpaid)

Published by

RUBBER AGE

250 W. 57th St., New York 19, N. Y.

Condensed Schedule of Rates for 1951 Edition

1 Page	$130.	2 Pages, each	$127.
½ Page	70.	2 Half Pages, each	68.
¼ Page	40.	2 ¼ Pages, each	39.
Colors, Red	extra $60.		
Other Colors	extra 85.		
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in **HEAVY DUTY TRUCK and BUS TIRES**
with **Spheron-9**
E*asy* **P***rocessing* **C***hannel BLACK*

LOW HEAT GENERATION
HIGH ABRASION RESISTANCE
HIGH TEAR RESISTANCE

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ANOTHER STRIKE!

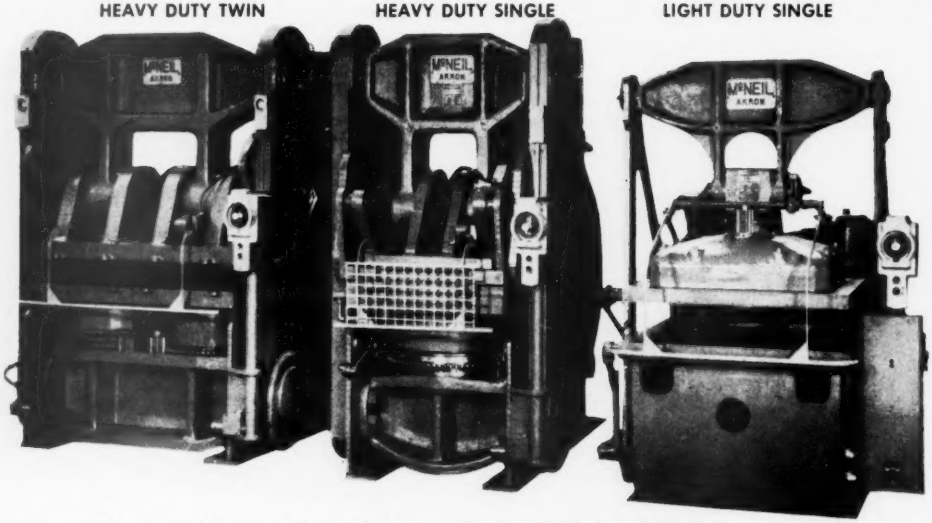
IN BOWLING,
WHEN A PLAYER MAKES
THREE CONSECUTIVE STRIKES, HE IS
SAID TO HAVE MADE A "TURKEY." WE AT
McNEIL HAVE ALSO MADE A "TURKEY" IN THESE THREE
MODELS OF OUR

MECHANICAL GOODS PRESSES

MODEL 800—24x24
HEAVY DUTY TWIN

MODEL 800—32
HEAVY DUTY SINGLE

MODEL 110—45
LIGHT DUTY SINGLE



MOTOR OPERATED — NO HYDRAULIC — SIMPLE SPEEDY ADJUSTMENT OF PLATENS

- 800,000 pounds total pressure
- Two 24" x 24" drilled platens Individually adjustable 1" minimum—6" maximum
- 700 pounds per square inch platen pressure
- Adjustments for mold loadings—zero to 200 tons each mold position
- Two 24" x 24" molds may be used in same or different thicknesses or one 24" x 48" mold

- 800,000 pounds total pressure
- 32" x 32" drilled steam platens
- 780 pounds per square inch platen pressure
- Adjustments of mold loadings—zero to 400 tons
- Range of mold thickness, 1" minimum to 5" maximum or 2" minimum to 6" maximum

- 110,000 pounds total pressure
- 40" x 40" drilled steel steam platens
- 70 pounds per square inch platen pressure
- Adjustment of mold loadings—zero to 55 tons
- Range of mold thickness, 4" minimum to 9" maximum

MANUFACTURING AGENTS

GREAT BRITAIN—Francis Shaw & Co. Ltd., Manchester, England
AUSTRALIA and NEW ZEALAND—Vickers Ruwolt Proprietary, Ltd., Victoria, Australia.

THE McNEIL MACHINE & ENGINEERING CO.

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RUBBER WORKING MACHINERY • INDIVIDUAL CURING EQUIPMENT FOR TIRES, TUBES and MECHANICAL GOODS

RHC SHORTAGES

INDONEX Plasticizers*

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with increased fillers or extenders can help maintain production without loss of quality.

Send for Bulletin 13 and list of specific Technical Circulars, or tell us your problem.

* **Are you** concerned about catalytic metals in your compounds? INDONEX shows less than one part per million of copper or manganese by spectrographic analysis.

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SUN PRODUCTS OFFER YOU "JOB PROVED" PERFORMANCE

Sun's wide selection of "Job Proved" petroleum products, plus the vast experience of Sun Engineers, can help you cut costs, step up production, and improve quality. Every Sun product, after its development in the laboratory, must pass rigid and exhaustive tests in actual use. When the worth of the product has been completely demonstrated in this way, then—and then only—it is given the "Job Proved" stamp and offered for sale. Detailed product information and the help of Sun Engineers are yours for the asking. Call your local Sun Office.

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INDUSTRIAL OILS

Original charge of Sunvis as good as new after three years' use in hydraulic press.

SUNVIS 900 OILS—Unexcelled for turbine lubrication, for use as a hydraulic medium, for circulating systems and similar applications requiring longest possible oil life, plus maximum protection to equipment. Sunvis 900 Oils have a high viscosity index and uniform 0°F. pour point, and are fortified against corrosion and oxidation.

SUNVIS OILS—Give long, trouble-free service in all types of industrial reservoirs and circulating systems operating at normal temperatures. Sunvis Oils have uniform high viscosity index, low pour point, and low carbon content.

SUNVIS H.D. 700 OILS—For internal combustion engines operating under heavy-duty conditions, or where hydraulic valve-lifters are used; for circulating systems and other industrial applications where contamination is a factor. The additives in Sunvis H.D. 700 Oils supply detergency, and minimize oxidation and corrosion.

SUNVIS 800 OILS—Special heavy-duty lubricating oils used in railroad diesel engines equipped with silver-alloy bearings.

SUNVIS 2200 AND SUNVIS 2300—Heavy-Duty Supplement #1 and Supplement #2 quality oils respectively. For use in diesel engines where high-sulfur fuels may be encountered.

DYNAVIS OILS—For internal combustion engines operating at moderate loads and speeds. These low-pour-point, high-viscosity-index, inhibited oils help prevent formation of harmful corrosive and sludge-forming acids.

CIRCO OILS—Straight mineral oils for general lubrication of industrial machinery. Unsurpassed for once-through applications, regardless of operating temperatures.

SUNTAC OILS—Recommended for general lubrication of all machines subjected to sudden shocks and load reversals. Compounded to increase adhesiveness, Suntac Oils cling to bearing surfaces and supply constant, superior lubrication.

STEAM CYLINDER OILS—Lubricants of high flash and fire point for saturated or superheated steam conditions and for worm gear speed-reduction units.

SUNOCO WAY LUBRICANT—Eliminates "stick-slip" of tables and scoring of ways. Noncorrosive, with outstanding metalwetting and adhesive properties, ample viscosity and E.P. qualities. Approved by 36 leading machine tool manufacturers.

ROCK DRILL OIL—High-film-strength oil for use in jackhammers, stopers, drifters, and similar equipment.

INDUSTRIAL GREASES

Sun grease increases steel mill production by cutting bearing failures 92%.

SUN GUN GREASES—Smooth greases made with medium-viscosity oil. Stable under pressure in power and booster guns.

"JOB PROVED" IN EVERY INDUSTRY **SUN**

SUN ADHESIVE PRESSURE GREASES—Won't drip or splash. Excellent lubricants for open-gear applications.

SUN DARK PRESSURE-SYSTEM GREASES—For power-driven central grease lubricating systems in heavy industries. Also used as "medium cup greases."

SUN MINE CAR GREASES—Available in several grades. Suitable for both antifriction bearings and plain-bearing cavity-type wheels.

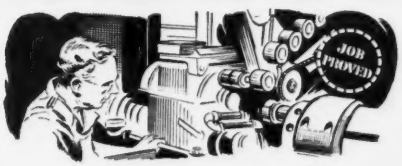
SUN MINING MACHINE LUBRICANT—Semifluid. For use where a light but adhesive grease is required. Resists separation and decomposition.

SUN ROLLER BEARING GREASES—For use on electric motors and generators and high-temperature machinery equipped with ball or roller bearings.

SUN GEAR COMPOUNDS—Black adhesive open-gear compounds and wire-cable greases. Recommended for power presses, mining machinery, worn reduction mills, crushers, pump gears, etc.

SUNOCO TRACTOR ROLLER COMPOUND—For crawler-type tractors. Provides good lubrication with exceptional sealing qualities.

METALWORKING OILS



Ball bearing manufacturer finds that Sunicut increases tool life 15%, eliminates sludging.

SUNICUT—Straight (non-emulsifiable) transparent cutting oils. Various grades for automatic screw machines and heavy-duty machining operations. Permit high speed production with excellent finishes, long tool life.

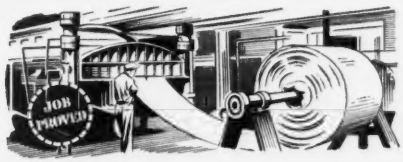
SUNOCO EMULSIFYING CUTTING OIL—An emulsifiable oil which produces a stable white emulsion. Efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and nonferrous metals. It is also an excellent grinding coolant. Available in heavy-duty grades too.

SUN QUENCHING OILS—Specially refined oils designed to aid development of maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel. Because of their low carbon content and stability under heat, these oils have an unusually long service life.

SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum, brass, and copper.

RUBBER-PROCESS AIDS



Two Sun rubber-process aids save manufacturer $6,000 a year by taking the place of five competitive products.

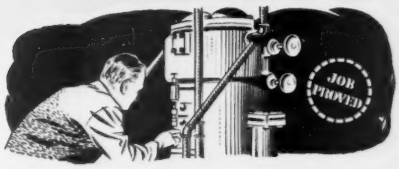
CIRCOSOL-2XH—An elasticator and process aid for natural rubber and especially for GR-S. Outstanding for sponge rubber.

CIRCO LIGHT PROCESS-AID—A processing agent and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber. Used for GR-S to some extent.

SUNDEX-53—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established process aid for rubber footwear stocks and semihard rubbers.

CIRCOMAR-5AA—A dark-colored product for processing natural and GR-S rubber used in tire-making. Also used in reclaiming natural-rubber scrap. Replaces asphalt fluxes. Free-flowing at room temperature.

REFRIGERATION OILS



Hotel turns to Suniso for its ice-making equipment; eliminates separation troubles, cuts oil costs 20%.

SUNISO REFRIGERATION OILS—High-quality oils having extremely low pour points, extremely low wax-separating characteristics, a high degree of stability, and long life. Initially neutral and resistant to formation of detrimental acids. Suniso grades are available to meet all low, normal, and high temperature conditions. The most widely used oils in refrigerating and air-conditioning.

SUNOCO WAXES

Waxes, "tailor made" to provide the exact properties demanded by different industries, are now available from Sun's new multimillion-dollar wax plant. Revolutionary manufacturing methods make it possible to retain only the wax portions desired for a particular use, while discarding those which might be detrimental.

Sunoco Waxes are precision-controlled for quality and uniformity of *all* physical and chemical characteristics important to the user. The various grades of Sunoco Wax are recommended on the basis of their ability to give superior performance *on the specific job.*

TEXTILE OILS

Sunotex replaces three formula components in textile mill; also saves 25% on costs.

SUNOTEX TEXTILE-PROCESS AIDS—Designed to impart desired additional properties to various fibers during their processing from the raw state into a manufactured product. All Sunotex textile-process aids are emulsifiable in water. Highest rating in Fade-Ometer tests.

SUN COTTON CONDITIONERS—Processing materials which prevent waste by cutting down excessive amounts of fly (fine air-borne lint particles).

SUN ASBESTOS FIBER CONDITIONER—Sprayed on asbestos during processing to keep fibers from being damaged or broken down. Harmful dust is minimized when this product is used.

SUN CORDAGE OILS—Generally used alone, but adaptable to various formulas used by cordage manufacturers. Selected products, highly compatible with additives.

SUNOTEX MACHINE OIL—One lubricant for nearly every kind of textile machine. A high-quality mineral oil and additive combination which prevents rust, clings to moving parts, and minimizes wear. Scours out of *all kinds* of fabrics easily and completely.

ADDITIONAL INDUSTRIAL PRODUCTS

SUN SOLVENTS—Sun Spirits for the thinning of paints, varnishes, and enamels, for metal-cleaning, and certain types of processing and extraction ... a pure, water-white petroleum solvent free of corrosive sulfur. Other Sun solvents with special properties are available for the chemical industry.

SUN LEATHER OILS—Petroleum-base leather oils. Used for obtaining the desired tensile strength, proper temper, and controlled moisture content. Maintain a light even color, mix well, and distribute evenly.

INDUSTRIAL PRODUCTS

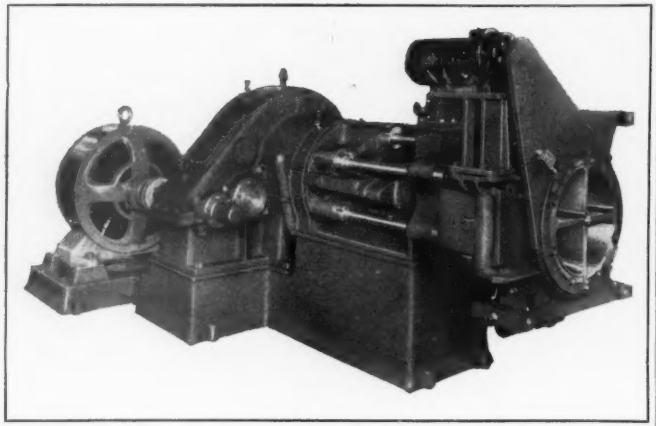
SUNOCO®

RUBBER & PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

IN BUSINESS TO **NRM** REDUCE YOUR COSTS

30% MORE PRODUCTION OF RECLAIM STOCK WITH NEW NRM STRAINER SCREW



You can now strain 30% more natural or synthetic stock by equipping your NRM strainers with a newly developed conical nose screw. Also, the customary bulk of contaminated stock, which must ordinarily be cut off when changing screens, is eliminated.

More uniform pressure and flow are other advantages realized with this important new strainer development. There is little or no increase in power requirements, and temperatures are maintained at a lower level. Temperatures stay lower since virtually stagnant stock around the outer diameter of the strainer plate is eliminated.

The new conical nose screw can be incorporated into your present strainers having a screw which extends into the head at a constant diameter to within an inch or so of the strainer plate.

Your inquiry or request for quotation —accompanied by complete information about your strainer—will receive a prompt answer. Write National Rubber Machinery Company, 47 West Exchange Street, Akron 8, Ohio.

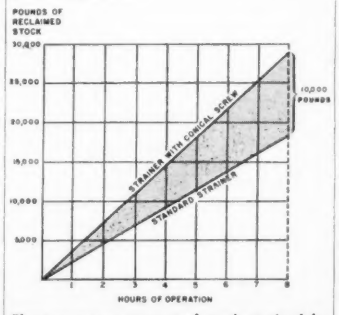
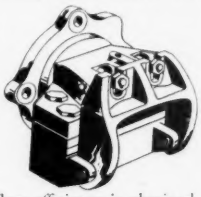


Chart compares amount of stock strained by two 8½-inch strainers. Lower curve is for standard strainer; upper curve is for new NRM quick-opening strainer equipped with the conical nose screw. In an eight-hour day, the strainer equipped with the conical nose screw produces an additional 10,000 pounds of stock.

New NRM Camelback Extruder Head easy to clean and change

NRM's newest camelback or tread-cap head demonstrates the simplicity of all of NRM's tuber and tuber accessory designs. The head is split horizontally, so that the upper half can be removed easily for cleaning at the end of a run. Die plates are clamped in place by a hinged drop gate, which can be opened readily for changing plates by merely loosening two swing bolts.



High material flow efficiency is obtained by elimination of roughness and small pockets which might cause sticking or burning of material passing through the head. This attention to profile and surface condition also reduces cleaning requirements.

The new extruder head is primarily for narrow sections of stock, such as those used in extruding camelback or tire tread cap sections. The same design can be used where a slab or ribbon is desired. The head can be applied to extruders of 4½ inches and larger. Two mounting styles are available—flange or screw type. Chrome plating (optional) is recommended.

NOW—COLD FEED EXTRUDING!

Many extruding jobs require pre-warming of the material on a two-roll mill, prior to feeding it into the extruder. This pre-warming can now be accomplished in the extruder itself, by use of a special cold-feed screw and liner which can be incorporated into any existing NRM rubber extruder.

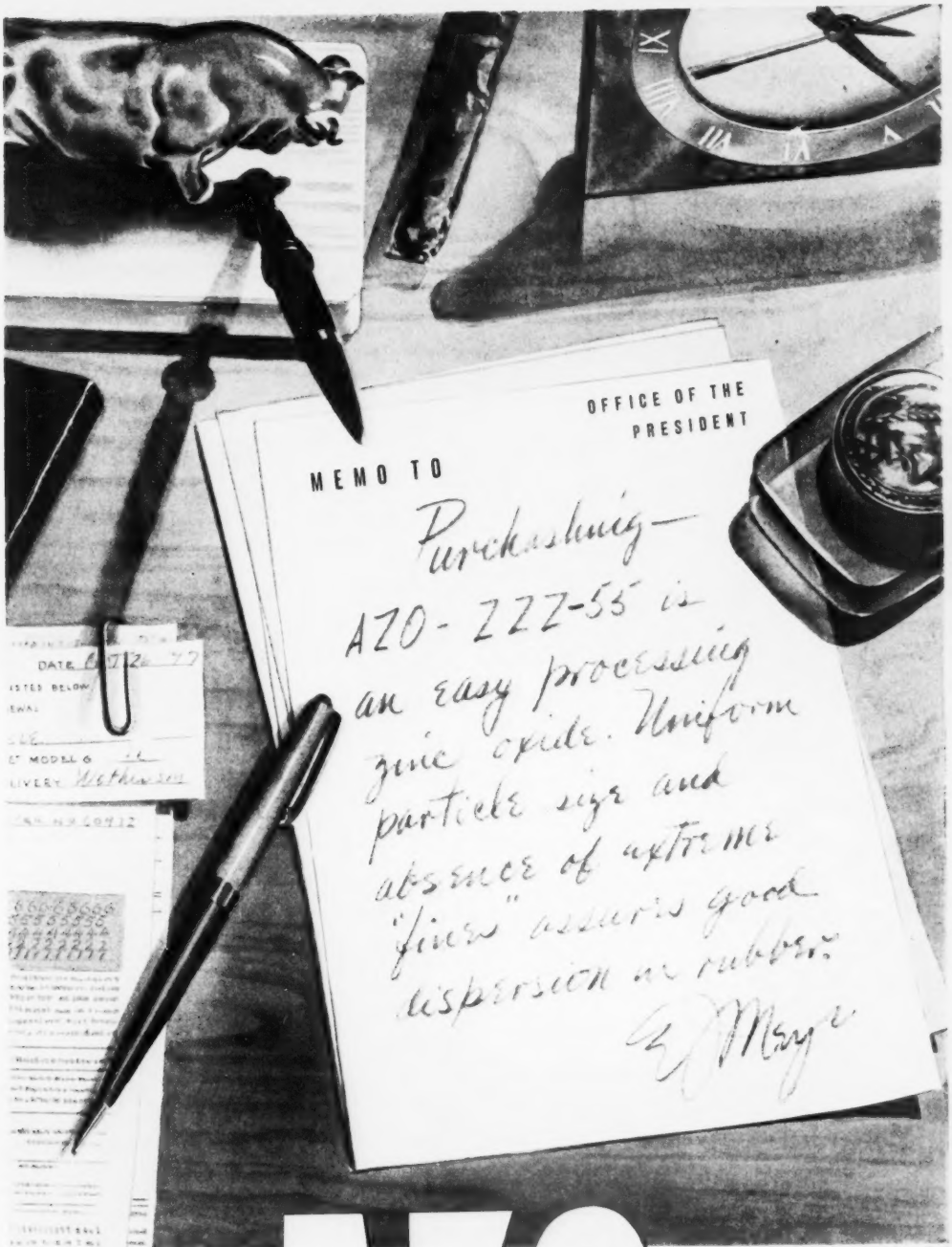
Tests show that a large part of the compounds used in the mechanical goods extruding industry can be successfully fed at room temperature in the modified NRM extruder. Other compounds can be handled with additional modification.

The production rate of a given extruder will be reduced somewhat by incorporation of this feature. However, the elimination of the warm-up mill and labor for its operation, reduced maintenance and floor space requirements will materially reduce extrusion costs.

NATIONAL RUBBER MACHINERY CO. General Offices & Engineering Laboratories Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EUROPE Rubber Machinery: GILLESPIE & COMPANY
96 Wall Street, New York 5, N.Y.

Creative Engineering



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AZO ZINC OXIDES

AMERICAN ZINC SALES CO.

Distributors for

AMERICAN ZINC, LEAD & SMELTING CO.

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Chemicals you live by

2 MONEYMAKERS...

FOR VINYL COMPOUNDING

Chlorowax 40* and Surfex* can be used separately or in combination to lower vinyl compounding costs and increase batch yields with no sacrifice in quality. Chlorowax 40 is DIAMOND ALKALI's liquid chlorinated paraffin which has proved highly satisfactory as a low-cost co-plasticizer. Surfex is one of DIAMOND's precipitated calcium carbonates—a reagent extender of high uniformity and purity.

The table indicates how these two DIAMOND chemicals may be applied in vinyl compounding to produce two-way savings. Specific formulas are available through your nearest DIAMOND Sales Office.

*®

	PARTS	
PVC RESIN	100	100
PRIMARY PLASTICIZER	52	47
*CHLOROWAX 40**	—	15
STABILIZER	3	3
STABILIZER—LUBRICANT	0.5	0.5
*SURFEX**	—	15
TOTAL	155.5	180.5
ESTIMATED MATERIAL COST LB. VOL.	45.8¢	41.6¢
YIELD—% INCREASE PER LB. OF RESIN		(By Vol.)
HARDNESS	85A	85A
TENSILE STRENGTH	2600 psi	2600 psi
ELONGATION	375%	375%
100% MODULUS	1400 psi	1400 psi
CRESCENT TEAR	375 lbs./in.	375 lbs./in.
BRITTLENESS—TEMPERATURE	-31°C	-29°C
HEAT LOSS	5.5%	4.7%

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

DIAMOND CHLOROWAX 40 AND SURFEX

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

Reds

CADMOLITH COLORS

Yellows

- INSOLUBLE IN ALL VEHICLES
- SOFT AND EASY TO GRIND
- BRIGHT CLEAR COLORS
- NON-FADING TO LIGHT
- ALKALI RESISTANT
- ACID RESISTANT
- HEAT RESISTANT
- NON-SETTLING
- NON-BLEEDING
- OPAQUE

With a combination of advantages found in no other red or yellow pigments—the direct result of Glidden leadership in research—Glidden Cadmolith* Colors are now adding new sales appeal and lasting beauty to an amazing variety of products . . . All shades available for prompt shipment!

Send for Folder giving complete details, with color chips. Write The Chemical & Pigment Company, division of The Glidden Company, Union Commerce Building, Cleveland 14, Ohio.

*Trade Mark Registered

QUALITY Glidden PRODUCTS

THE CHEMICAL & PIGMENT COMPANY
Division of
THE GLIDDEN COMPANY
Baltimore, Md. • Collinsville, Ill. • Oakland, California

SUNOLITH* Lithopone

ZOPAQUE* Titanium Dioxide

CADMOLITH* Cadmium Red and Yellow Lithopone

"Here's Why We Find LINERETTE PAPER Ideal For Separating Lightweight Stocks"–

LINERETTE provides a quick, easy method of separating stock without adhesion.

•

LINERETTE preserves the tackiness of the stock.

•

LINERETTE contains no oil or wax which might migrate.

LINERETTE, in use for over 20 years, is thoroughly tried and proved. It is a specification sheet, made to rigid standards of quality. Although we do not suggest LINERETTE as a substitute for Holland cloth, we believe some companies have been so using it with success. We can furnish LINERETTE in any width up to and including 54", in rolls of 9", 11½", 13", and 15" diameters; put up on 3" i.d. cores. The yield is approximately six square yards to the pound. A 9" roll contains 375 linear yards and a 15" diameter about 1150 linear yards. We will send you samples — simply specify width desired.

INFORMATIVE, ILLUSTRATED BOOKLET ON REQUEST

THE CLEVELAND LINER & MFG. CO.
5508 Maurice Avenue • Cleveland 4, Ohio, U. S. A.
Cable Address: "BLUELINER"

West Coast Representative:—MERIT WESTERN COMPANY
1248 Wholesale St., Los Angeles 21, Calif.

MADE BY THE MANUFACTURERS OF CLIMCO PROCESSED LINERS

LINERETTE
INTERLEAVING PAPER

CLIMCO

CLIMCO

RUBBER MATS

PARADENE
NEVOLL
R-16

MECHANICAL GOODS

PARADENE
NEVOLL • R-GRADES
X-1 RESINOUS OILS

WHITE WALL TIRE STOCKS

R-13 • R-14 • R-15

How NEVILLE can serve the Rubber Industry

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PARADENE
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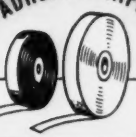
R-6 • R-17 • R-29

Why not call on Neville's years of research and experience for help on your rubber production problems?

ADHESIVE TAPE



PARADENE
R-17 • R-19 • R-29

RUBBER SOLES & HEELS

PARADENE
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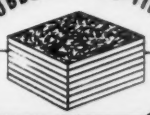
RUBBER FLOOR TILE



R-12 • R-16
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• Products listed are all coumarone resins except Nevoll and X-1 Resinous Oil

THE NEVILLE COMPANY

PITTSBURGH 25, PA.

Chemicals for the Rubber Industry

R-40

"by HADLEY'S"

means **TOP** *quality*
TOP *performance*
with **LOWER** *production costs*

HAB-U-CO
RESIN EMULSIONS

they EXTEND and TACKIFY
all TYPES of LIQUID LATICES
SYNTHETIC or NATURAL (LATEX)
(G. R. S.-NEOPRENE-NATURAL)

Send Today
FOR TECHNICAL DATA AND SAMPLES
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A PROVEN PRODUCT MANUFACTURED UNDER CLOSE LABORATORY CONTROL

as EXTENDERS . . .

they are used to replace a high percentage of the rubber content in Latex Cements, thus lowering costs.

as TACKIFIERS . . .

they are used to modify the degree of tackiness desired in the dry cement film.

HAB-U-CO Resin Emulsions are light in color thus precluding any undue staining or discoloration of cemented surfaces.

SINCE 1919
HADLEY BROS.-UHL CO.
514 CALVARY AVENUE • ST. LOUIS 15, MO.

Largest Conveyor Belt Press in the World
35' by 9'—total pressure 7800 tons
G. Siempelkamp & Co., Maschinenfabrik, Krefeld, (Germany)

The design and manufacture of processing rolls has been a highly specialized division of our business for more than 30 years.

Close co-operation with industry has given us an intimate knowledge of production problems and enabled us to make many important contributions to the development of modern, more efficient processing machinery.

When you are in need of roll renewals or are ready to specify for new processing equipment, consult us. Our engineering experience and production facilities are at your service.

UNITED ENGINEERING AND FOUNDRY COMPANY

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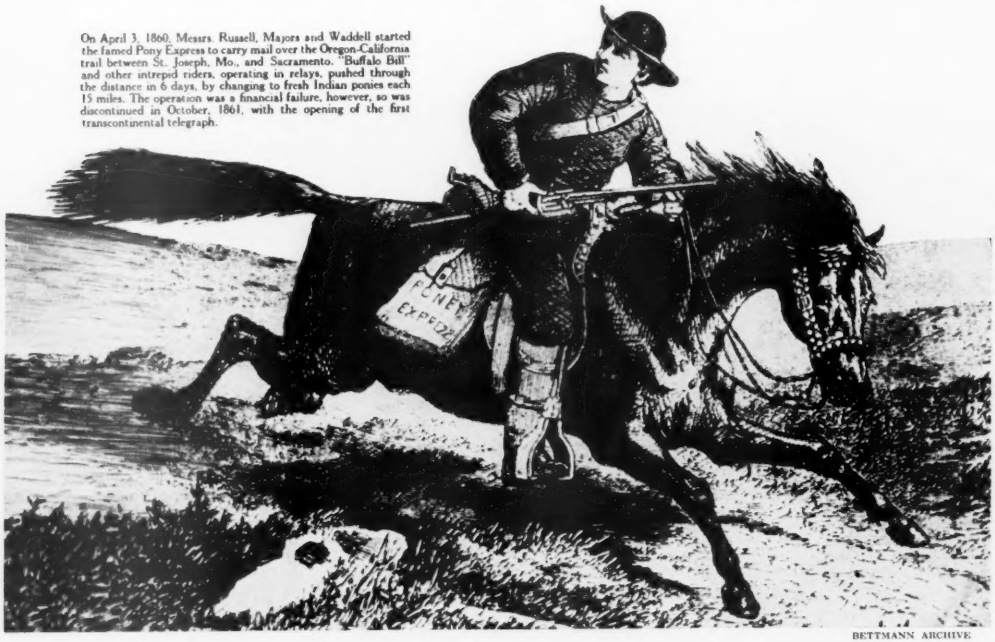
Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and Other Heavy Machinery. Manufacturers of Iron, Nodular Iron, and Steel Castings and Weldments.

PIONEERS OF THE CENTURY

(THIRD OF A SERIES)

On April 3, 1860, Messrs. Russell, Majors and Waddell started the famed Pony Express to carry mail over the Oregon-California trail between St. Joseph, Mo., and Sacramento. "Buffalo Bill" and other intrepid riders, operating in relays, pushed through the distance in 6 days, by changing to fresh Indian ponies each 15 miles. The operation was a financial failure, however, so was discontinued in October, 1861, with the opening of the first transcontinental telegraph.



BETTMANN ARCHIVE

1860-PONY EXPRESS

THE Pony Express organizers, like many other pioneers, learned the wrong way that business ventures can succeed only so long as they keep pace with technologic progress.

In those years none were more aware of this than the thirty or so small companies that comprised the embryo rubber industry. Doubly difficult was their task of creating a variety of rubber articles that would not become sticky in hot weather nor brittle in the cold. For it required the simultaneous development of two new industrial arts: (1) vulcanization and (2) compounding finely-divided powders, such as Zinc Oxide.

Those early compounders appreciated many of the properties that Zinc Oxide imparts to rubber, as is evident from patents and technical literature of those days. A published recipe for an engine packing of that period, for example, showed the use of 53 parts of Zinc Oxide to 100 parts of rubber:

ENGINE PACKING—ABOUT 1860

Para rubber	25 parts
Java rubber	5
Zinc Oxide	16
Magnesia	6
China clay	3
Red lead	2
Sulfur	1⅞

Even in the light of modern formulating practice, that recipe represents an excellent compound based on inorganic acceleration.

To assist those compounders, The New Jersey Zinc Company early developed a brand of Horse Head Zinc Oxide especially adapted for use in rubber.

For over a century, The New Jersey Zinc Co. has continued to pioneer outstanding developments, many of which have helped speed the progress of the rubber industry

HORSE HEAD ZINC PIGMENTS

The Pioneer Line

Most used by the rubber industry since 1852

THE NEW JERSEY ZINC COMPANY

Founded 1848

160 Front Street, New York 7, N. Y.

HORSE HEAD PRODUCTS

UNIFORMITY

from batch to batch, bag to carload

AERO* BRAND STEARATES

Such a high degree of *uniformity* is no accident. It results from Cyanamid's continuous chemical control of composition, texture and particle size.

You benefit two ways:

better control of your process,
improved quality of your product.

For your added convenience, and for greater protection, AERO Brand Stearates are packed in multi-wall bags.

Write today for booklet describing AERO Brand Stearates.

*Trade-mark

A complete Line of AERO Brand Stearates

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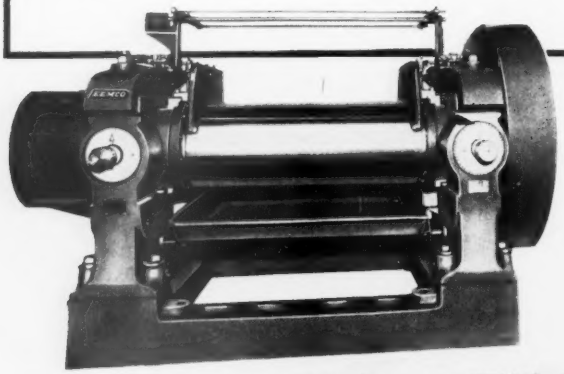

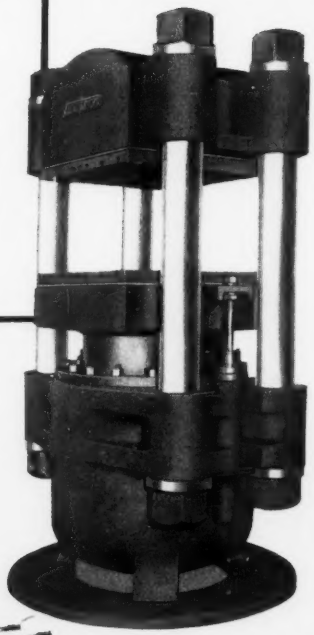

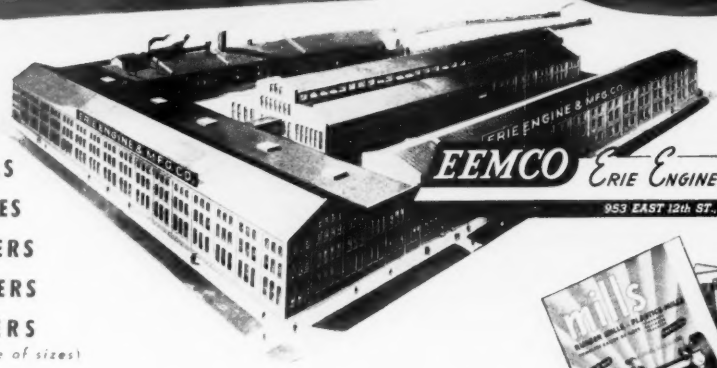

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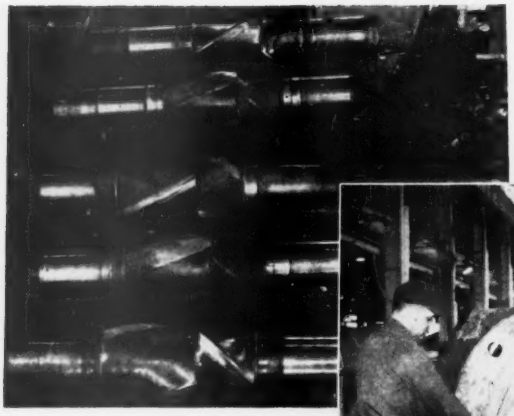

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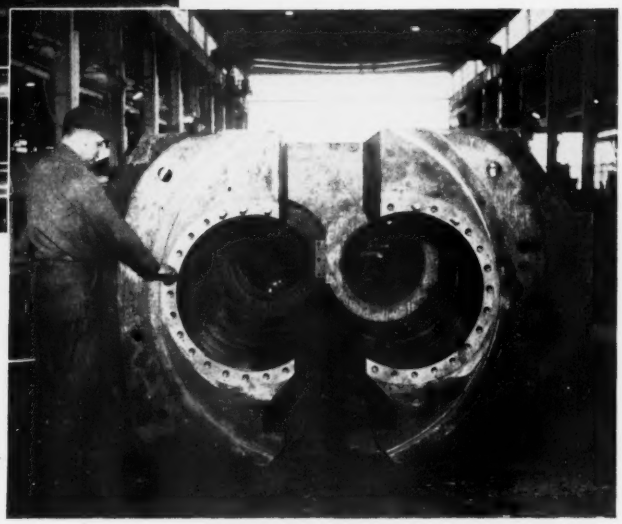

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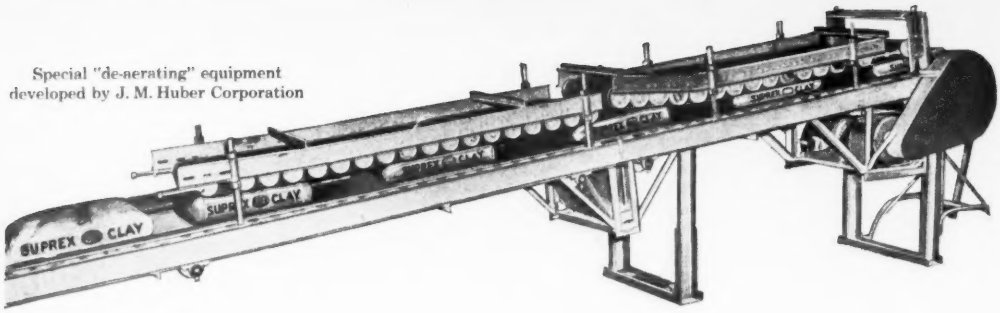

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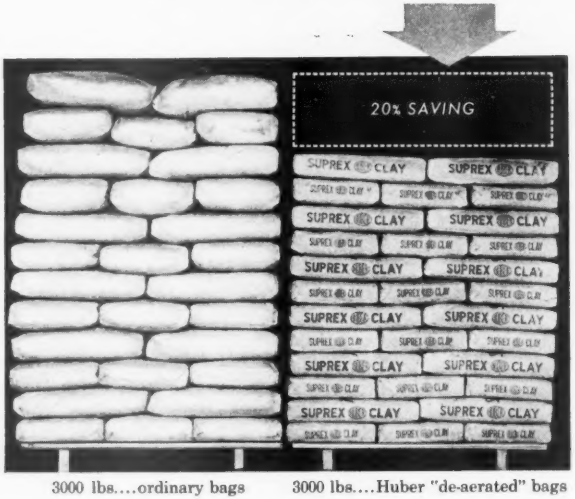

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RUBBER AGE

Vol. 68, No. 4 JANUARY, 1951

The Extensive Utilization of Rubber and Plastic Elastomers in the U. S. Navy

By T. A. WERKENTHIN

Principal Materials Engineer in Charge of Rubber and Plastics Section, Bureau of Ships, Navy Department, Washington, D. C.

QUESTIONS raised at a recent meeting of rubber experts made the author aware of the need for a brief presentation setting forth the extensive utilization of rubber and plastic elastomers in ships of the United States Navy. It appears that the active participation of the Bureau of Ships in developing test methods which, incidentally, resulted in nearly a hundred widely-used testing procedures covering all phases of evaluation, has given a somewhat distorted picture of the Navy's interest in rubber. Our interest in guayule and synthetic rubber compounding, and our extensive reference to hose and gasketing, has given perhaps undue emphasis to these Navy uses.

When considering the use of rubber on Naval vessels it should be borne in mind that it involves the use of rubber on all sizes of ships, including battleships, carriers, cruisers, repair ships, submarines, destroyers, destroyer escorts, landing craft, on down to whale boats, life boats and even inflated rubber craft. Without the thousands of rubber items used in its construction, and in its equipment, the modern fighting vessel could not operate. It has been estimated, for example, that in carriers of the Midway class, over 60,000 pounds of rubber is used.

Exceptional care must be used in selecting all shipboard rubber materials because the ship may be thousands of miles away from home port. This is particularly true of those rubber parts which are normally submerged or inaccessible except during docking operations. We cannot, for example, change the rubber shaft covering or replace water-lubricated rubber bearing strips during a cruise. The combination of sunshine, salt spray and air, and rapid temperature changes, are extremely destructive to many materials.

Highly important information on service life and performance of rubber integral or component parts and rubber auxiliary equipment comes regularly to us from our experienced laboratory technologists who visit ships while they are being docked in the Navy Yards at San Francisco, Mare Island, Puget Sound, Portsmouth, New York and Philadelphia. This source of information helps us in constantly improving all these rubber items.

In order to consider the use of rubber on board ship as systematically as possible, we have divided this study into four major sections, as follows: (1) Underwater Coatings and Protective Coverings; (2) Rubber in Machinery and as Component Parts; (3) Auxiliary Ship Equipment; (4) Miscellaneous Rubber Items. The latter section will include all those items that do not fit into the other categories.

Underwater Coatings and Protective Coverings

In discussing the hull uses of rubber, we may mention the coatings of the rudder, strut, shaft, and other underwater exposed surfaces. In addition, coatings have been provided for water intake and exhaust connections. There are several anti-corrosive–anti-cavitative types

Note: The opinions or assertions contained herein are the private ones of the author and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

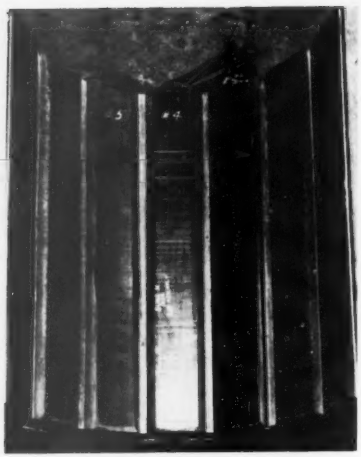

FIG. 1—Oil-resistant butadiene-acrylonitrile synthetic rubber bearing strips which have been subjected to experimental conditions tending to blister the rubber.

that may be used here. For instance, there are the flame-sprayed polysulfide synthetic rubber coatings which are supplied in powder form and which are applied through a flame similar to a gas welding flame. The flame softens the powder almost to the molten state and when the powder in this form is impinged on a warm metal surface, such as a rudder, shaft or a propeller strut, it solidifies and forms a rubberlike coating. This type of coating was recently discussed in some detail by E. A. Bukzin *(1)*.

As a result of much comprehensive experimental work extensive improvements have been made in the adhesion and in the resistance of this coating to cavitation and corrosion. In order to correct some misunderstanding with respect to flame-sprayed coatings it should be pointed out that the earlier types of flame-sprayed coatings were hornlike and had very little flexibility, whereas the newer types of coatings are truly rubberlike in appearance and behavior.

Rubber in Machinery and as Component Parts

An interesting and extremely successful rubber application of many years standing is the rubber coating of the main propulsion shaft. At first, the lining of the main propulsion shaft was limited to that portion of the shaft which is within the stern tube, because this portion of the shaft could not be inspected during docking until the shaft was pulled. However, due to the fine results obtained with these rubber coatings, it was recently extended to the tail shaft as well.

Rubber coating of shafting has a very interesting history. Insofar as the Bureau's records indicate, the rubber coating of shafting was first observed on the German liner, the Leviathan, which was captured in World War I. When the ship was being converted to troop carrying service, the rubber covering was discovered. One of the American rubber companies was asked to determine whether they could repair the slight damage which had occurred in the rubber covering. The American manufacturer repaired the German coating, and continued to improve the coating in every respect in close collaboration with the Navy.

The primary improvement was with respect to the degree of adhesion obtained between the rubber and metal. This was effected by the use of a combination hard rubber underlayer and a soft outer rubber covering which has shown service life of well over 20 years. In both shop or dry dock this coating operation is generally done in two layers in order to insure complete watertight integrity of the coating. After the wrapping is complete, steam is applied to the inside of the hollow shaft for several hours until complete vulcanization of both the inner hard rubber and the outer soft rubber takes place. For the large combatant ships, this hard rubber coating is used exclusively because it has exceedingly strong mechanical and chemical adhesion to the metal and is protected from scuffing by the soft rubber outer layer.

This type of rubber shaft covering has been in use for over 30 years and has been found to give thorough protection to the shaft from corrosion. Formerly flame-sprayed coatings and some chloroprene brush type coatings had the advantage of being applied in the dry dock. Some acrylonitrile organosols can also be applied in dry dock. While the coating of shafting with sheet synthetic rubber has generally been done in the shop by having the shaft chucked in a lathe, it has recently been announced that coating with sheet rubber can be accomplished in dry dock without removing the shaft from the ship. This latest development is an accomplishment by industry which may lead to many other interesting applications. Instead of curing by passing steam through the hollow shaft, the dock-wrapped coating is cured, after wrapping with a special self-tightening cotton cloth, by low pressure (open) steam introduced into a loose tarpaulin cover.

Since several manufacturers have shown considerable interest in self-curing coatings for underwater surfaces it is felt that progress will now be on a greatly accelerated basis. Some liquid polymer polysulfide types of coatings are self cured under atmospheric conditions in the summer time merely by the addition of an accelerator just prior to application. The rate of cure can be expedited, however, by the use of either hot air or infrared heating.

Closely related to underwater external coatings are oil- and fuel-resistant coatings which have shown promise in reducing corrosion of fuel tanks particularly when used for Diesel oil or gasoline tankers. Ordinarily such tankers require complete overhauls and replacement of oil tank bulkheads within five to seven years due to heavy corrosion in the cargo tanks. When these tanks are protected with the newly-developed coatings, the tanks will merely require cleaning and no structural overhaul or repair. Furthermore, the problem of making such tanks gas free and explosion-proof when emptied is greatly simplified.

At the present time there are three coating systems under actual service evaluation. They are: (a) Polyvinylidinechloride multiple coat systems; (b) Polyvinylchloride systems, and (c) Polyvinylchloride reverse phase systems. These three coatings were selected from a group of some 28 coatings. Naval tanks are unique in requiring resistance to sea water as well as oil, due to the water replacement system used in all Naval ships to maintain ship stability.

An important application requiring excellent adhesion between rubber and metal is in water-lubricated rubber bearing strips which are extensively used in main propulsion bearings. In Figure 1 will be seen the lower half of water-lubricated rubber strips used in an experi-

mental bearing after having been subjected to high loading pressures in an experimental assembly. Formerly, the bearing strips were made of natural rubber compounds and had the tendency of showing blisters after having been used in the main propulsion bearings. Natural rubber was replaced by butadiene-acrylonitrile type bearings which have shown no blistering or blow-out tendencies, even under extremely severe experimental conditions of pressure and temperature. The conversion from natural rubber to synthetic rubber was done as a conservation matter, but it proved to be a superlative advantage in that the use of these synthetic rubber bearings has almost completely eliminated this type of service failure of water-lubricated main propulsion bearings. At one time this deficiency was so marked that there was danger of complete abandonment of water-lubricated rubber bearings until the advent of the synthetic rubber formulations.

In Figure 2 is shown a 14-inch bearing test machine installation in which all service conditions can be duplicated. Since in a short time all extremely severe conditions can be reproduced, the machine quickly evaluates experimental rubber compounds. Variations are made by raising or lowering the temperature by controlling the cooling water and the bearing pressure load. Simulated service tests have been correlated very closely with service conditions so that new experimental types of bearing strips may be readily evaluated to determine any technical advances resulting from new compounding studies made by the manufacturers supplying the water-lubricated bearing strips. Acrylonitrile bearings have much better resistance to blow-out, better abrasion resistance, and show lesser tendency to squeal when operated at slow speeds. Actually, the synthetic rubber bearing is many times more serviceable than the best natural rubber bearing.

Auxiliary Ship Equipment

An important shipboard use for rubber is found in the grommets and sheaths for aerials, radio, radar, signal lights, water-tight cable fittings through the hull, etc. Still another is in the matting used for vibration absorption, particularly used to reduce the fatigue of personnel standing watch. Such matting is especially important for personnel standing watch in or near the engine room where they are subjected to machinery vibrating at high frequency and great amplitude. It has been determined that the use of this rubber matting greatly decreases fatigue and concomitantly increases alertness.

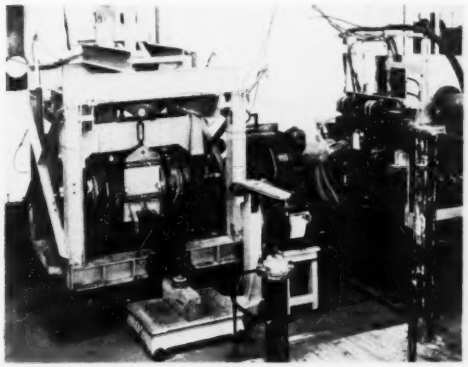

FIG. 2—View of 14-inch bearing machine installation for subjecting water-lubricated rubber bearings to a variety of simulated service conditions.

FIG. 3—Grooving machine used in preparing deck seams for the application of synthetic rubber caulking.

Vulcanized rubber linings which are permanently adhered to decks are used for wet spaces, such as heads, washrooms and laundries. Slip-proof deckings for weather decks are provided to permit sure footing, even when decks are awash with green seas. Static dissipating or conductive matting or flooring is applied in powder rooms and ammunition spaces to prevent sparks and possible explosions. The basic difficulty in such installations is that any improvement in fire-retardant characteristics generally means a concomitant lowering of electrical properties; however, rubber matting has been developed which is satisfactory in both respects.

Prior to World War II, a rubber latex-hydraulic cement type of decking was extensively used. Due to the shortage of natural rubber, it was found necessary to develop slip-proof thin film decking which required no rubber constituent. As a result, the so-called light weight deck covering of abrasive in a plastic matrix was developed and utilized.

Seams of wooden decks have for years been caulked with so-called "Marine Glue," a type of asphalt compound applied over oakum or cotton which is forced into V-shaped grooves formed by cutting bevels in the planks. Wartime shortages forced a change from decks made of teak to those made from domestic woods. Marine glue, which never worked too well on teak decks, proved even more unsatisfactory in maintaining tight seams with the domestic wood decks. Accordingly, new caulking compounds were developed by industry.

Among these new compounds are the so-termed liquid polymer polysulfide compounds. These compounds are supplied in a double container, the lower container having the basic matrix and the upper (and smaller) container having the vulcanizing accelerator which is added just before use. The liquid polymer coatings have the definite advantage of being much easier to apply, since all the laborious preliminary caulking with oakum or cotton wick is eliminated. The reduction in cost of application is somewhat offset, however, by the much greater material cost.

The new coatings show much superior adhesion to wood and much better initial flexing properties, as well

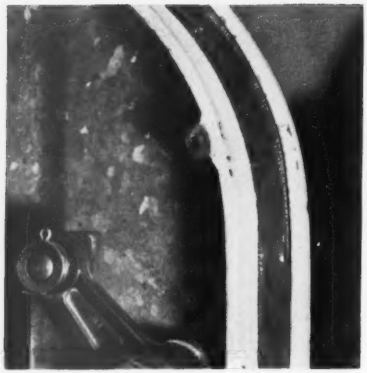

FIG. 4 — Water-tight door gasket showing signs of ozone cracking.

as excellent stability under wide temperature changes. The first liquid polymer compounds tended to bubble and soften at high temperatures and to shrink or crack at low temperatures. Presently available materials, however, are much improved and should prove adequate even for the Navy's severe service requirements.

Marine glue has always been a source of trouble, becoming soft and gooey in summer and brittle in winter, and the new sealing compounds present no such difficulties. Of even greater significance is the remarkable resistance of these new compounds to the impingement of flames issuing from jet fighter planes when they are applied to carrier flight decks. The average Marine glue melts and is blown all over the deck whenever the jet plane exhaust impinges on the flight deck. Incidentally, it has been found possible to apply liquid polysulfide caulking materials by using high pressure grease guns.

Since the use of rubber caulking materials eliminates the need of oakum or cotton wicking, it has been found necessary to cut a somewhat different bevel in wood decks. An ingenious grooving machine developed for this purpose by the personnel of the Puget Sound Naval Shipyard is shown in Figure 3.

Since water-tight integrity has to be maintained throughout the ship, the use of rubber in air- and water-tight doors and hatches is an extremely important one. The use of ozone and ultraviolet light resistant waxes in compounding has resulted in a greatly increased life for those rubber gasketing materials which are subjected to the action of light, ozone, and general weather exposure. Much of this improvement in rubber gasket materials is the result of periodic inspection by specially trained personnel of all rubber items aboard ship, whenever naval vessels are in port for repairs, refueling, or alterations. When defective material is discovered the details are brought to the attention of the manufacturer involved. By establishing a regular mechanism of check-up of quality we are able to evaluate the effectiveness of specification changes. There is a considerable interval between the time a new or revised specification is issued and material procured under it is actually utilized for shipboard use. Further increases in life expectancy of gaskets will result. The problem of developing satisfactory water- and weather-tight gaskets is an extremely complicated one, especially so since requirements have been set up so that the gaskets must now show satisfactory performance at —35° F.

Under sub-zero conditions, such as are encountered in Arctic or Antarctic operations, ordinary rubber products exhibit many changes in their physical characteristics which may completely destroy their usefulness or serviceability. Most of the regularly commercially available rubber gaskets harden with lowering temperatures, becoming brittle, losing their resiliency, and shrinking.

All presently known rubberlike polymers exhibit these thermal effects to a greater or lesser degree. Natural rubber undergoes slow crystallization at approximately —10° F., while chloroprene in the ordinary form begins to crystallize at 32° F. Butadiene-styrene copolymers do not crystallize, but lose some of their desirable properties around —45° F. Butadiene-acrylonitrile copolymers likewise do not crystallize, but usually become hard and brittle at 10° F. The low temperature characteristics of these copolymers improve as the acrylonitrile content is decreased.

Considered from the standpoint of resistance to weather and sunlight, chloroprene gaskets are undoubtedly superior to those of other synthetic rubbers or of natural rubber. Chloroprene, unfortunately, shows extremely poor properties after long period exposure to low temperatures since it has the unfortunate characteristic of crystallizing. It has been necessary to develop special formulation gaskets which have a low modulus and, therefore, require low deflecting pressure. The gaskets must also show resilience even under low temperature conditions and must not assume permanent set or deformation after having been indented by the "knife-edge" of the door while subjected to low temperature exposure.

A severe condition of crazing and cracking is shown in Figure 4. Under the same weather exposure conditions a chloroprene gasket will show very little cracking and crazing. In Figure 5 is shown an assembly of several water-tight doors used as a simulated service test at the Rubber Laboratory in the Mare Island Naval Shipyard. As a result of an extensive low temperature test program we are now in a position to procure water-tight and air-tight gaskets which are satisfactory at temperatures as low as —35° F. Recently it was demonstrated that for gasket materials to show satisfactory performance at low temperatures, they must not show extensive compression set after long periods of deflection, and it is even more important that the rubber must show rapid recovery after release of load even though still subjected to low temperature.

A word as to the essentials involved will be in order, particularly since the "limiting hardness" is now applicable to all low temperature work. The torque re-

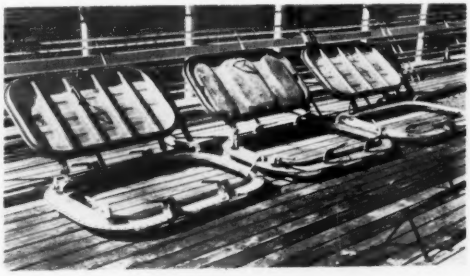

FIG. 5—Water-tight and weather-tight doors for shipboard use exposed on a laboratory roof for simulated service tests.

quired to produce a $\frac{1}{8}$-inch indentation of the scuttle coaming into rubber gasket materials has been found to range between 20 and 44 footpounds. Hand loading tests on 18-inch internal diameter scuttle indicated that it was possible for operators to exert torque values from a satisfactory minimum of 25 footpounds with an overhead mounting to a maximum of 120 footpounds when the scuttle was mounted on the deck.

Further, it was found that the scuttle could be sealed from leakage against a hydrostatic pressure of 15 psi at minimum torques ranging all the way from 3 to 10 footpounds for the various gaskets tested. On a quick-acting door, torque values ranging from 90 to 160 footpounds were required to seal against leakage at 15 psi hydrostatic pressure for several different gasket stocks. On tests using a dog-type door, it was found that by applying an equal torque to the individual "dogs" (usually 10 "dogs" per door), torques from 35 to 75 footpounds were required to seal against 15 psi hydrostatic pressure.

Several years ago it was determined that, within limits, harder gaskets seal better against "knife-edge" type doors than softer gaskets. However, since aluminum doors and hatches used aboard ship distort when too much pressure has to be exerted to close them, it was necessary to establish the "limiting hardness" that could be tolerated. The details of how the "limiting hardness" was arrived at have already been published *(2)*.

It should be pointed out that the torque values obtained on tests to seal against pressure and to indent into the gaskets are subject to a number of variable factors, such as friction, and must therefore be considered as approximate. All of these factors are inherent in the gasket materials and the particular water-tight door construction generally in use, and were taken into consideration in arriving at the "limiting hardness" value for gasket stock.

The variation in the force in footpounds which different operators can apply to the scuttle handwheel when mounted overhead and when mounted underfoot was also taken into consideration. A value of 60 Shore Hardness was set as the maximum hardness of gaskets to be used at any time, even at temperatures of —35° F. Extensive laboratory and service tests were made and will be presented in detail in another article.

FIG. 6—Section of 6-inch oil suction-and—discharge hose with cut rubber cover.

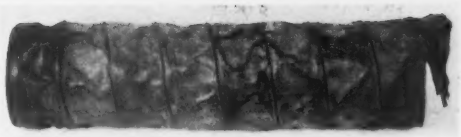

FIG. 7—Condition of special hose after 88,000 flexes. This hose was designed for use where temporary ventilation has to be effected.

Miscellaneous Rubber Items

An extremely important and diversified shipboard use of rubber is hose. Some 34 specifications cover the many different types and varieties of hose used on board ship. The hose varies in size from large 4-, 6- and 8-inch oil and gasoline suction-and-discharge types to smaller hose such as steam hose, air hose, sandblast hose, fire extinguisher hose, oxy-acetylene welding hose, etc. In addition there are highly specialized hoses, including diving hose, submarine rescue chamber hose, and hot-plastic-paint hose.

The latter is a heat-resisting hose which has electrical connections for a bare resistance wire running the length of the hose which maintains the contents at the desired high temperature. Since this hose has to carry hot plastic hull paint at 400° F. under considerable pressure, it is necessary to protect personnel in case of an accidental burst to prevent the hot paint from painfully scalding personnel or from bursting into flame as soon as it hits the air. A loose-fitting heavy duck cover is therefore fitted over the entire length of the hose. When a break occurs, it is immediately noticeable by the duck cover ballooning out. The duck covering thus prevents the hot paint from splattering until the pressure can be shut off at the heater pot.

Another unusual hose is that used to provide fresh air and exhaust used air from submarine rescue chambers operating below the surface of the water. In addition to resisting high internal pressures these hoses must resist crushing external pressures as high as 600 pounds per square inch. Diving hose must also resist high internal and external pressures and must be constructed as light as possible so as not to retard the underwater progress of the diver. Hoses used in certain hydraulic systems must withstand bursting pressures up to 3000 pounds per square inch.

The handling of all sorts of hose, particularly hose used in fueling operations from ship to ship, results in damage to the hose rubber cover. A special technique has been developed for repairing any breaks in the outer rubber cover. This method is so simple that no special training is needed. Breaks, cuts, or worn spots in the rubber cover permit moisture to enter, causing mildew and corrosion to the fabric in the carcass or to the wire reinforcing section of the hose.

A liquid polymer polysulfide compound similar to the wooden deck sealer compound was developed. Repairs are effected by cleaning the damaged section of the hose with a wire brush, then applying the freshly blended material with a putty knife. Subsequently, the damaged section is taped to protect it during cure. Curing takes place spontaneously without external heat being applied. There is no shrinkage or loss of volatile material. Figure 6 shows a hose having cuts and abraded cover which can be easily repaired with this material.

The liquid polymer polysulfide is unique in that it will

FIG. 8—View of a 38-inch I.D. rubber injection scoop fitting (expansion joint).

establish excellent adhesion to the rubber cover and to the exposed fabric regardless of whether the original cover was of natural rubber, chloroprene or any of the other synthetic rubbers generally used for manufacturing hose covers. The resulting coating will generally resemble the original rubber coating and, if properly applied, will last the life of the hose. The prompt and consistent use of this hose repair material will save the government hundreds of thousands of dollars.

Still another unusual type of hose is illustrated in Figure 7. This hose was developed by Mr. Hamblin prior to his retirement from the Air Conditioning Section of the Bureau of Ships. This hose is used wherever temporary ventilation has to be effected. In a recent test for serviceability, this hose was subjected to 88,000 flexes from minimum to maximum expansion and the figure shows the conditions of the hose after this severe test.

An extensive investigation was undertaken recently at the Rubber Laboratory of the Mare Island Naval Shipyard to determine the possible deleterious effect on aviation gasoline of the type of plasticizer used in compounding the synthetic rubber tube stock of gasoline suction-and-discharge hose. A very interesting discovery was made when some 46 different conventional plasticizers were evaluated. It was determined that the amount of non-volatile plasticizers extracted by the aviation gasoline was not the most important criterion of suitability of the plasticizer. For example, in some cases the amount of non-volatile constituent extracted was greater than of another type of plasticizer even though the overall deleterious effect on the gasoline was much less. All phosphate-bearing plasticizers decreased the octane rating of the gasoline by well over 10. Under identical conditions, the other plasticizers decreased the octane rating by less than 2 octane numbers. Hose manufacturers will be interested to note that as a result of this investigation, the use of phosphate-bearing plasticizers in the manufacture of liners for gasoline hose and in fuel cells has been prohibited. A suitable test to detect phosphate-bearing plasticizers is included in the specifications for gasoline hose.

Besides its extensive use in various types of hose, rubber is also used in permanently installed piping, such as expansion joints. Recent evaluations which indicated that an expansion joint built of successive layers of chloroprene and asbestos had excellent fire-retardant properties have greatly stimulated the use of these expansion joints. A typical section of an expansion joint is shown in Figure 8. These chloroprene-asbestos expansion joints have shown excellent serviceability compared to natural rubber or metal expansion joints.

Rubber and synthetic rubber expansion joints have the additional advantage of attenuation of noise transmitted to the hull of the ship. The rubber joint has a much longer life and greater serviceability than corresponding metal joints. Besides good fire-retardant properties, the expansion joints must also have low internal heat build-up. The comparatively high internal heat build-up of most synthetic rubbers has precluded their use in heavy-duty tires and similar applications, such as these expansion joints, in which the high rate of expansion and contraction has a tendency to build up internal heat resulting first in ply separation and finally in blow-out. Extensive testing and compounding carried out jointly by the manufacturer and the New York Naval Shipyard Material Laboratory have brought to light weaknesses in the construction and in the method of reinforcement and have resulted in greatly improved service life of expansion joints.

A highly specialized and extremely important use of rubber is the lining of the entire battery compartment of submarines. Such lining involves techniques that have been successfully accomplished by the Mare Island Rubber Shop and by two or three rubber manufacturers. In most instances the lining of the compartment consists of two layers of sheet rubber applied in such a manner that scarfed seams never overlap. Vulcanizing of the lining generally has to be carried out at the low temperature of 125° to 140° F.

Rubber lining with sheet material is now being supplemented experimentally by a brush-applied material using chloroprene. Successive coats are brushed on. Whereas the sheet lining is applied in a uniform thickness no less than ¼-inch, the brushed-on type of coating is rarely more than 3/32-inch thick and is apt to be quite irregular in thickness. In addition to protecting the inner hull of the submarine from acid corrosion as a result of spillage of sulfuric acid from the batteries, it is generally believed that the lining contributes to the protection of the storage batteries from the concussion caused by depth charge explosions.

Prior to World War II, the lining was either natural rubber or a non-oil resistant synthetic rubber. It was determined, however, that considerable damage was

FIG. 9—Rubber lining of a battery compartment showing indentations left by batteries in partial loosening of the lining from the steel.

caused by hydraulic and diesel oil leakage (Figure 9). All rubber lining jobs are now made with oil-resistant synthetic rubber, preferably of the butadiene-acrylonitrile type.

Rubber is also used aboard ship in specialized radio and radar parts, exemplified by the antenna diaphragm. Figure 10 shows the male and female molds used by the Rubber Laboratory and Rubber Shop of the Mare Island Naval Shipyard for these diaphragms. The Rubber Laboratory, in collaboration with the Bureau of Ships Rubber Branch, designed a synthetic rubber spring to be used in conjunction with bogie wheels for aquatic tracked vehicles. A synthetic rubber spring greatly increases the shock absorbing characteristics of the tracked vehicles and thus increases the over-all life of the equipment. When a rubber spring is not utilized, the shock of the rough terrain is picked up by the track and is transmitted through the bogie wheel tire to the torsilastic spring and rubber bumper. In the Mare Island Rubber Laboratory design the shocks would be distributed between the bogie wheel tire, the rubber spring, the torsilastic spring and the bumper, thus greatly decreasing the heat build-up within any one of the four individual constituents. The use of rubber springs has been applied in street car wheels for several years. Figure 11 shows a set-up for an axial deflection test with bogie wheel and synthetic spring assembly. By redistributing the over-all shock, it becomes feasible to use synthetic rubber instead of natural rubber in the construction of torsilastic springs and bogie wheel springs, tires and bumpers.

A very interesting Naval use of rubber is in clutches and brakes. The rubber is used in transmitting power from the prime mover to the propeller shaft and subsequently to the propeller itself. For example, it is used in the form of an expandable gland or tube known as an Airflex clutch for reversing direction of rotation. The largest ships in which these Airflex clutches have been used to date are some LSTs transmitting 3,000 h.p. per shaft. It is interesting to note that one of the first industrial applications of Airflex clutches and brakes was in oil well drilling equipment where the constant reversing of the equipment constituted extreme strain on the equipment.

Airflex clutches originally were constructed with 100% natural rubber. However, as a result of extensive investigations carried out jointly by industry and the Bureau of Ships, it was determined that clutches made with synthetic rubber had greater life due to good oil resistance and generally showed much greater serviceability.

An extremely important shipboard utilization of rubber and one that is continually increasing in scope and degree has to do with vibration absorption mounts and noise attenuation equipment. Unfortunately, shock and vibration mounts for shipboard use have to be designed on an entirely different basis than similar equipment for shore use because provision has to be made for the effect of gun blast and depth charge impact. Much extremely complicated testing has to be undertaken in order to design and to evaluate various types of shock mounts. For example, Figure 12 shows the equipment used in determining natural frequency. The shock absorbing and resilience characteristics of rubber change considerably with temperature. Luckily, there are now some formulations that are much less affected by temperature changes than those first used.

No discussion of rubber shipboard uses would be complete without a discussion of safety equipment, gas masks, fire fighting equipment, protective equipment for guided missile fuels, and other rubber items for protection of personnel. This highly important application would take considerable space and will be the subject of a separate article for future publication.

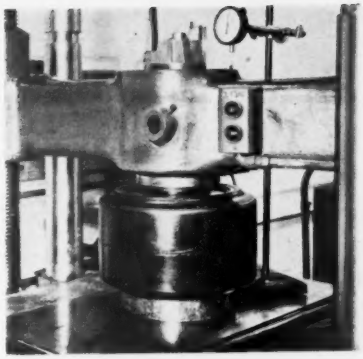

FIG. 11—Set-up for axial deflection test on the bogie wheel tire rubber spring design developed at the Mare Island Rubber Laboratory.

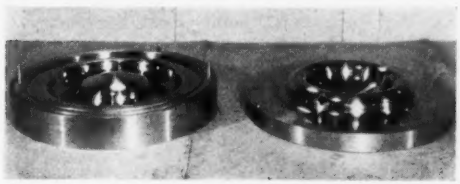

FIG. 10—Male and female antennae diaphragm mold used by the Rubber Laboratory of the Mare Island Naval Shipyard.

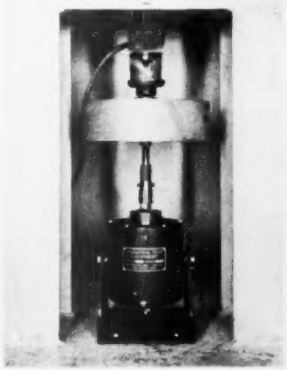

FIG. 12—View of the equipment used to determine natural frequency.

Conclusion

The enormously increased complexity and diversity of uses of rubber in Naval application has required the development of over one hundred additional testing techniques by experts in laboratories under the supervision of the Bureau of Ships or working in conjunction with the Bureau. These techniques have been assembled by the author and were published in two compendia in 1946 *(3)* and 1949 *(4)*.

The final proof of fitness, however, continues to be behavior of products on shipboard under both normal and combat conditions. With the abnormally high price and scarcity of natural rubber, it gives a feeling of satisfaction that so few requirements for natural rubber still exist for us. Almost complete conversion from natural to synthetic rubber was effected by the Bureau of Ships during World War II without any apparent deterioration in the quality or performance of any of the rubber items procured under some 148 different specifications. As a matter of fact, in a good many cases the conversion from natural to synthetic rubber has vastly improved the engineering and performance characteristics of component parts. We have held on to the ground we won by not reconverting to natural rubber.

When it is remembered that natural rubber has been vulcanized, compounded, blended, calendered, rolled, etc., for over 100 years, it will be recognized how much we have yet to learn about synthetic rubbers which are about one-fifth that old and have been used an even shorter time aboard Naval vessels. As more technical information is secured on these synthetics, extensive improvements in end products will result. New uses for rubber aboard Naval vessels are continually being discovered. One of the largest contributions is expected to be in the field of noise elimination and acoustical protection for Naval vessels. This will undoubtedly be responsible for many new applications of rubber in order to avoid transmission of noise or in absorbing noise already made when it cannot be abrogated.

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Additional Reports of Avoidable Accidents

FROM time to time reports of avoidable accidents which occur in rubber manufacturing plants in this country and abroad appear in the Rubber Section Safety Newsletter of the National Safety Council. Data on some typical accidents follow herewith:

Failure to Cut Off Power: The following accident occurred in a foreign rubber plant: An employee was called to the 8-inch tuber to fix the piston of the tread-cutting device. The motor, piston, and knife of the tread cutter were on the left side of the machine. The pipefitter thought that the electric current was disconnected, and tried to bring the cutter unit to the other side of the conveyor belt by pulling on the V-belts of the motor. As he pulled the V-belts, the cutting device slid along its guides and, on its way, hit the automatic switch, which turned the current on. The employee, who had his right hand close to the motor pulley, had his fingers caught between the pulley and V-belts. His right middle finger was amputated above the distal joint.

This accident again emphasizes the importance of making sure that electric switches are in the off position and are red-tagged before an employee repairs equipment or otherwise gets in a dangerous position. A number of machines use electric eyes or limit switches as automatic stopping and starting devices. As in this case, they may mislead the employee into thinking that the power is off. Therefore, it is necessary to caution employees on this point and explain to them the necessity of checking to see that the main switch has been pulled and tagged.

Sleeve Caught by Roll: Recently a lost-time accident occurred in a rubber plant when an employee caught his loose sleeve either between the fabric and an idle roll or on a screw which projected from the end of the roll. In either case, the fact that the employee had a loose sleeve played a major part in causing the accident. In addition, no revolving roll or shaft should have any projection which might catch an employee's arm.

Although another employee pulled the safety cable and stopped the equipment, the location of the safety cable was such that it could not be reached by the injured employee. Location of safety cable near hazards is most important since they should be easily accessible in case of accident.

Wind-Up Accident: An employee was starting a liner on the liner table. As he reached over to wrap the liner end around the shell, he also stepped on the pedal switch. His right arm and forearm were caught in the wind-up, causing an exposed fracture of the two bones of the forearm, one of them in two different places.

Preventive measures: Supervision was again requested to warn all employees who work on wind-up equipment of the extreme danger of putting hands near the wind-up with the equipment in motion. The foot switch on this liner table has been moved and bolted down securely at a distance away from the end of the table so as to make it impossible to step on it and reach across to the wind-up at the same time.

The proper placement of foot switches away from the danger point of the wind-up is most desirable on liner tables. The switch should be permanently fastened down and must be of the constant-pressure type if accidents are to be prevented. The use of rubber bands in starting the liner on the shell is also recommended.

Compressibility Studies on Polymers

INTERESTING information on the properties of polymers at high pressures—between 1000 and 10,000 atmospheres—has resulted from compression experiments recently conducted by C. E. Weir of the National Bureau of Standards with the cooperation of the Carnegie Institution of Washington. Volume-pressure curves have been fitted to the experimental data, providing a convenient basis for comparison of compressibilities.

The high-pressure experiments were carried out as part of a broad program of research now under way at the Bureau on the fundamental properties of high polymers. Polymeric substances—such as rubber, plastics, textiles, leather, and papers—owe their strength, elasticity, and plasticity to the long, chain-like structure of their molecules. The Bureau is investigating the basic constants and properties of these materials in order to learn more about their molecular structure and to interpret their behavior in the form of useful products. While the high-pressure apparatus employed in this work was designed primarily for use in the Bureau's investigation of leather shrinkage, it has been found of value for studying the high-pressure properties of a number of high polymers.

In the experiments at the Bureau, a polymeric specimen was immersed at room temperature in a suitable pressure-transmitting liquid within the smooth bore of a thick-walled bomb of hardened steel. A leak-proof piston was then forced into the bomb, increasing the hydrostatic pressure within and thereby compressing the specimen. At intervals the depth of penetration of the piston and the corresponding hydrostatic pressure were measured. Depth of penetration was determined to 0.0001 inch by means of a dial gage mounted on the ram used to drive the piston into the vessel. Internal hydrostatic pressure was measured with a manganin pressure gage, which makes use of the very small change in the resistance of a coil of manganin wire with pressure. To take into account effects due to compression of the confining liquid, the piston and ram, the packing washers, and other parts, as well as distortion in the bore of the bomb, a comparison experiment was performed in which the specimen was replaced by a steel bar of similar volume.

For transmission of pressure to the specimen, a liquid was required which would not freeze in the pressure range studied and would maintain fairly low viscosity and electrical conductivity under high pressure. Only a few such liquids are known at present; many which ordinarily have very low viscosity become grease-like under extreme pressure. The use of Varsol for this purpose has thus far limited the materials investigated by the Bureau to those least likely to be affected by immersion in it.

Apparatus used by the National Bureau of Standards to study the compressive properties of high polymers.

Polymeric materials studied include the synthetic plastics polyvinylidene chloride (Saran), polymonochlorotrifluoroethylene (Kel-F), polytetrafluoroethylene (Teflon), polyethylene, and a polyester (Selectron 5003); the raw synthetic oil-resistant rubbers Hycar OR-25, Hycar OR-15, neoprene, and Thiokol ST; and the natural polymers cellulose and collagen (the principal constituent of leather). Several tanned leathers were also investigated.

In general, the compression observed for all the materials studied fell within a range between the compression values for true solids, which are rather low, and those of true liquids, which are considerably higher. This finding is in agreement with present concepts of the molecular structure of polymeric materials, which are believed to possess a higher degree of order than is found in liquids but less than that of true solids.

It was found that the compression of the specimens could be described within experimental error by means of the equation

$$\frac{\triangle V}{V_o} = a(P - 2000) + b(P - 2000)^2 + c(P - 2000)^3$$

in which $\triangle V$ is the volume change between 2000 atmospheres (the base pressure in these studies) and the pressure P, and V_o is the volume of the specimen at 1 atmosphere. The values of a, b, and c determined from the experimental data are given in Table I. The similarity in the values of these coefficients emphasizes the close relationship between compressibility and gross molecular structure, which is similar for all materials studied.

TABLE I—COMPRESSIBILITIES OF POLYMERIC MATERIALS

Material	Coefficients of Pressure Terms a x 10^6	b x 10^{10}	c x 10^{15}
Polyvinylidene chloride (Saran)	2.17	19.0	8.73
Polymonochlorotrifluoroethylene (Kel-F)	0.99	4.74	0.83
Polyethylene	1.89	14.5	6.10
Polyester (Selectron 5003)	1.76	12.3	4.82
Hycar OR-25 (raw)	2.26	12.3	4.82
Hycar OR-15 (raw)	2.17	20.3	9.42
Neoprene (raw)	2.04	17.5	7.66
Thiokol ST (raw)	1.92	14.1	6.07
Cellulose (dry)	0.92	3.25	0.29
Leather (Collagen and various leather tannages)	1.23	5.60	1.35

Apparently small differences in molecular structure have little or no effect on compressibility; this is evident when the values for polyethylene, neoprene, Thiokol ST, and Selectron 5003 are compared. The agreement between values for Selectron 5003, a brittle material, and the rubbers, which are highly elastic, emphasizes again the fact that the high elasticity of rubbers results from ease of deformation rather than high compressibility.

The lower compressibilities of cellulose, leather, and Kel-F were to be expected as these materials are somewhat denser at 1 atmosphere than the other polymers. The values given for leather represent an average of the data obtained on vegetable, chrome, and retan leathers as well as on hide collagen and kangaroo-tail tendon, all of which exhibit essentially the same compressibility. It was found that removal of the moisture ordinarily contained by leather (generally about 15% by weight) had little noticeable effect on compression.

Many unexpected polymorphic transitions and freezing points have been encountered in the high pressure field. One of these, the freezing of water to form ice VI, occurs at 8710 atmospheres at 20° C. with a large decrease in volume. This transition provided a convenient reference point for calibration of the pressure gage used in the Bureau's experiments. In the measurements on the polymeric materials, the only transition observed occurred in Teflon (polytetrafluoroethylene) at 5500 atmospheres* and 25° C. and was accompanied by a 2 percent decrease in volume. This abrupt change in compressibility made it impractical to fit the compressibility data for Teflon to an equation of the type given above. Below the transition the compressibility of Teflon is similar to that of Kel-F while at pressures above the transition it is nearer that of polyethylene.

Second-order transitions, observed as rather marked changes in slope of the volume-pressure curve, have been reported by investigators in other laboratories for some types of rubber in the pressure range studied. All of these rubbers, however, had been vulcanized and generally contained fillers. In the present studies no evidence of second-order transitions in the raw rubbers was found at room temperatures; all compression curves were smooth with the exception of that for Teflon.

EDITOR'S NOTE: For further details on these compression experiments, the reader is referred to two recent research papers made available by the National Bureau of Standards, namely: (1) High-Pressure Apparatus for Compressibility Studies and Its Application to Measurements in Leather and Collagen (Research Paper No. 2160), and (2) Compressibility of Natural and Synthetic High Polymers at High Pressures (Research Paper No. 2192).

* This pressure is somewhat lower than that given by Bridgman in *Proc. Am. Acad. Arts and Sci.*, Vol. 76, p. 55 (1948).

Rubber Manufacturing Activities in Various Foreign Countries

ADDITIONAL reports on rubber manufacturing activities in various foreign countries, compiled by the United States Department of Commerce from miscellaneous sources, including embassies and consulates, follow herewith:

Italy: Immediately after the outbreak of the Korean war the Italian demand for rubber products more than trebled. In July of 1950, 300,000 tires were sold, against a normal July average of only 100,000. Dealers sold virtually all of their stocks.

This intensification of demand apparently was fostered in part by a relative stabilization of prices, although manufacturers raised prices 5 percent in July on products made of natural and synthetic rubber and on August 5 added 15 percent on products made of natural rubber and 24 percent on products made of synthetic. The Italian Government requested that it be informed before any further increases were made. Although manufacturers are still pressing for greater increases, officials of the Rubber Association believe the Government will seek to prevent excessive price advances.

The rubber industry apparently is reluctant to expand production greatly until it sees whether demand holds up, and the Association believes that purchases of rubber, natural and synthetic, will be held to a more or less "normal" consumption trend. Stocks are estimated at approximately 2 months' production, the normal quantity. The natural and synthetic rubber required by the industry in 1949 was up to 35,000 metric tons.

Portugal: The rubber product industry of Portugal can supply the bulk of domestic and colonial requirements, and the industry has been assisted by official measures to restrict foreign competition. Whereas imports of rubber and rubber products in 1946 were valued at 178,000,000 escudos, progressive restrictions on imports reduced foreign purchases to 50,000,000 escudos in 1949, of which about one-third consisted of basic raw materials. Practically all imports of rubber and products decreased in the period 1946-49. Automobile tires and tubes fell from 114,000,000 escudos in 1946 to 16,000,000 in 1949. (One escudo in 1946 and 1947 = $0.0405; in 1948, $0.0402; in 1949; $0.0348; and in 1950, $0.0345.)

In 1946, out of total imports of 141,000,000 escudos' worth of rubber products, the United States supplied 73,000,000 escudos' worth; in 1949 the United States share was less than one-fourth, the remainder being supplied by Western European countries. Preliminary figures indicate that the 1949 import-trade level was maintained in 1950. Portugal may be expected to produce the bulk of its rubber products and to limit its imports to raw materials and specialty items, wherever possible, from non-dollar sources.

Austria: Over-all output of the Austrian rubber products industry in the first half of 1950 was 9,323 metric tons, compared with 6,772 tons in the corresponding period of 1949.

Tire and tube production in the first half of 1950 amounted to 60,949 passenger car tires and 76,092 tubes; 59,618 tractor, truck, and bus tires and 76,296 tubes; 41,006 motorcycle tires and 55,694 tubes; 938,663 bicycle tires and 751,258 tubes. Monthly production figures indicated increases in each type in 1950 over corresponding figures in 1949 and 1948.

Total output of rubber footwear in the first half of 1950 was 1,133,529 pairs, compared with 886,346 pairs in the like period of 1949; and of rubber soles and heels, 362.6 metric tons, compared with 837.4 tons. The drop in production of soles and heels was attributed to decreased demand.

Production of rubber hose in the January-June period of 1950 was 566.1 tons compared with 380 tons in the like period of last year; and of belting, 211.1 tons compared with 173 tons.

Advances in the Uses of Rubber in Engineering: 1949-50

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This survey, which covers the literature from July, 1949, to July, 1950, was prepared for and presented before the Rubber and Plastics Division of the American Society of Mechanical Engineers at its Annual Meeting held in New York City on November 30-December 1, 1950. No attempt has been made to include developments of a purely chemical or theoretical nature. The subject matter of the survey is devoted to advancements which are of interest to mechanical engineers. A few last-minute corrections have been made by the author in the introductory portion to bring the paper more up to date.—Editor.

ANY discussion of recent advances in the field of rubber must necessarily be preambled by a survey of the international and economic rubber situation during the past year. The remarkable development of synthetic rubber during World War II years has advanced to such a stage that in many fields synthetic rubber has progressed from competitor to the successor of natural rubber. Obviously, this situation creates a problem for the natural rubber producers and considerable concern is being evidenced *(1)*.

The rubber situation today is acute. The sources of 90% of our natural rubber supply are in jeopardy because of the political instability of Indonesia and the threats of Communism in Malaya and Indo-China *(2)*. In June, 1949, the price of GR-S was 18½ cents per pound; in June, 1950, the price was the same. On Dec. 7th, 1950, the price was advanced to 24½ cents a pound. However, in June, 1949, the price of natural rubber was 16 cents a pound while one year later it was 35 cents a pound and since then it has risen to as high as 90 cents a pound.

Statistics show that the various synthetic rubbers have declined sharply from their wartime peaks *(3)*. GR-S supplied 59% of the total synthetic consumption in its peak year, 1944, but only 29.2% in 1949. According to rough calculations *(4)* if there is produced 1,550,000 tons of natural rubber, 900,000 tons of which are to be used by foreign countries, there remains 650,000 tons for the United States. If 100,000 tons are deducted for stockpile use this leaves 550,000 tons to supply requirements of about 1,025,000 tons, or a deficit of 475,000 tons. About 108,000 tons of this are used in the form of butyl, neoprene and nitrile types. This leaves 367,000 tons of GR-S to keep up rubber goods production under relatively normal conditions.

Until June 30, 1950, the Government's synthetic rubber activities were conducted under the Rubber Act of 1948. This legislation provided that capacity for production of synthetic rubber should be maintained and required that minimum quantities be produced and consumed each year. In his legislative recommendations to Congress *(5, 6, 7)*, President Truman requested ten year controls of the synthetic rubber industry along with a method of disposing of the government-owned plants to private industry over this period. On June 24th, the President signed the Senate-House compromise bill which continues government ownership and operation for a two year period.

Although opposition was originally expressed *(8)* by some leaders in the rubber industry the facts remain that since the United States has no control over the supplies of natural rubber it is necessary to create a source which is dependable and will insure security. This has been done by government regulation and steps have been taken to increase the annual output of synthetic rubber and to build up a larger stockpile *(2)*. One step toward government decontrol in the period covered has been the conclusion of the patent pooling on synthetic rubber *(9)*.

In July, 1950, a decision was made by the government to reactivate one of the GR-S plants, one of the butyl rubber units, and a butadiene plant *(10)*. Recent authorizations have been granted for the reactivation of all of the copolymer units. In October the government took another step toward building up the national rubber stockpile. This comprises a general limitation on the use of natural rubber *(11)*. The new regulations, issued by the National Production Authority, limited consumption to 75% in November and 63% in December of the average monthly use for the 12-month period preceding June 30, 1950. The new regulations also restricted the use of natural rubber latex for the fourth quarter of 1950 to one-fourth of the 1949-50 fiscal year and required importers of latex to offer at least 10% of their shipments to the government. There are indications that the government will shortly take over the buying and distribution of all natural rubber. (EDITOR'S NOTE: On December 28 the government became the sole importer of natural rubber).

Cold Rubber Developments

Within the past year "cold" rubber had advanced from the batch process to the continuous polymerization process *(12, 13, 14)*. The greatest difficulty of this conversion was trying to keep air out of the system. The most important advantageous features of continuous polymerization are (a) simpler equipment and greater ease of temperature control, (b) the variations in the conversion levels and viscosity of the polymers are smaller, and (c) continuous blending of the ingredients gives a more uniform latex and a product of higher more uniform quality.

Infra-red investigations have shown that the molecules of cold rubber have a *trans* chain structure while those of GR-S have a mixture of *cis* and *trans* *(15, 16)*. Since natural rubber consists of a *cis* structure cold rubber resembles natural rubber more closely only because of an improved regularity of structure.

Improvements are constantly being made in the polymerization formula *(17)* and compounding and processing variables *(18, 19)*. Claims have been made *(20, 21, 22)* that the tread wear of tires made from cold rubber

black masterbatches is better than that of tires in which furnace black was mixed in the Banbury. Since the reinforcement of cold rubber with fine furnace blacks represents an important new advancement *(23)* toward the improvement of tread performance, the concept of the carbon black gel complex has been introduced *(24)* as an explanation of the significant differences between the various types. Improved processing and performance of natural rubber has also been attributed to the carbon black gel *(25)*.

The use of a fine particle silica in regular or "cold" rubber shows definite superiority to the calcium silicate pigment and even surpassed black compounds with respect to elongation, rebound, and heat build-up *(26, 27)*. Comparative data *(28)* have been assembled which show the similarity in the physical and chemical properties and also in the compounding data of American cold rubber, the German Buna S-3, and Polysar S. In addition to its use in tires a description has been given of a flexible cable made with cold rubber insulation and neoprene jacketing *(29)*.

While standard cold rubber is polymerized at 41°F., emulsion can be effected at temperatures as low as −40°F. *(30)*. Although data on tire tests are still too scant to draw definite conclusions there is some evidence of improvement in tread wear and more positive evidence of improved tread crack growth but no indication of a revolutionary trend.

In summarizing the cold rubber situation it should be emphasized *(31)* that cold rubber like regular GR-S requires carbon black loading to have sufficient toughness even for carcass stocks. Even though it is more resilient than the old GR-S this improvement is not sufficient to overcome the handicap caused by the use of black especially for larger tires. The greatest benefit from the use of cold rubber is in tire treads and when used with the recently developed HAF blacks its wear is somewhat better than natural rubber.

New Types of Rubber

Vulcollan is a recently introduced highly elastic material *(32)*, prepared by reacting linear polyesters with a "bulky" diisocyanate. These materials have good tensile and aging properties and suggested fields of applications are for protective coatings.

Research is being continued on the polymerization and processing of polymers of butadiene, butadiene-styrene, and isoprene by means of Alfin catalysts which are special combinations of sodium salts *(33, 34, 35)*. Improvements are being made to obviate the difficulties originally encountered in the milling and compounding procedures and the resulting vulcanizates show better tensile and abrasion properties than the corresponding emulsion polymers. A product which shows promise for use in tire carcasses is obtained by the copolymerization of butadiene and styrene with sodium as the catalyst *(36)*; however, further tests are needed before actual claims can be established.

Polymers with greater cut growth resistance are obtained by the use of the Buna S-3 recipe which is a modification of the GR-S formula *(37)*. Clear polymers which show indications of being used as replacements for natural rubber in chemical reactions such as chlorination, cyclization, and hydrochlorination are obtained by the solvent polymerization of isoprene and styrene-isoprene *(38)*. The polyacrylic rubbers are recommended as specialty rubbers where the service conditions are too severe for the conventional products, such as for O-rings, gaskets, grommets, hose, actuating diaphragms, valve seats, packings, etc. *(39, 40)*. Neoprene Type W is a newly developed chloroprene polymer which is more stable than other neoprene products and is characterized by greater resistance to compression set *(41, 42)*.

Depolymerized rubber, which has been under continuous development for a number of years, is now commercially available as DPR, a thick, flowable, all-rubber liquid *(43, 44, 45)*. Depolymerized rubber compounds can be spread, troweled, or cast into molds and vulcanized in hot air at atmospheric pressures. New types of polyurethanes made from castor oil and diisocyanate furnish products which vary from extremely hard to soft rubbery materials. These exhibit good electrical and physical properties and provide good shock dampeners *(46)*.

A rather interesting observation has been made whereby the rate of the emulsion polymerization of GR-S has been doubled by irradiation with ultrasonic energy *(47)*. The exact role of the ultrasonic agitation in accelerating these reactions is not understood.

Compounding

Physical test data of the rubber reinforcing properties of high abrasion furnace blacks record the improved reinforcement possible with this black in both GR-S and natural rubber *(48)*. The general effects of high temperature mixing of fully reinforcing carbon blacks in synthetic and natural rubbers are evidenced by lower power rate of extrusion, less nerve, higher modulus, lower tensile, higher rebound, and a lower resistance to abrasion *(49)*. The tendency for rubber mixtures containing reinforcing furnace black to scorch can be minimized by using a thiazoyl disulfide for acceleration and a nitrosodiphenylamine as retarding agent *(50)*. In a study of the effect of various carbon blacks on the heat transfer characteristics of vulcanizates the results show that the blacks differ markedly in their effects *(51)*. The differences in the electrical properties of various carbon blacks in natural, GR-S, cold, and butyl rubbers is attributed to the degree of dispersion of the carbon black inherent in the particular polymer *(52)*.

Homogeneous blends of neoprene, natural rubber and acrylonitrile furnish heat resistant compositions suitable for tire molding bags, conveyor belts, and gaskets *(53)*. Oil resisting natural rubbers have been obtained by the addition of aliphatic chlorothiol acids *(54)*. Dense rubbery compositions are produced by the incorporation of fusible metallic substances, as dense fillers, in a fused condition into natural or synthetic rubbers *(55)*. A study of directional effects in dielectric properties of molded rubber show that flow during molding produces a structure in which the dielectric constant and dissipation are greater in the direction of flow than in other directions *(56)*. This fact offers the possibility that an extrusion head could be designed to take advantage of this effect in cable manufacture.

Low Temperature Evaluation

Within the past year emphasis has been placed on low temperature evaluation of natural and synthetic rubbers as a result of the extreme importance placed by the armed services on the adequate performance of rubber after exposure to low temperatures *(57)*. Compounding variables which affect the low temperature behavior include the type and amount of plasticizer, particle size of the carbon black, and extent of vulcanization *(58, 59, 60)*. The low temperature flexibility of GR-S can be improved by increasing the amounts of plasticizer and carbon black without too great a deterioration of physical properties; tensile strength appears to increase slightly.

Progressive stiffening due to crystallization has been observed for vulcanizates of Hevea, Neoprene Type GN, butyl rubber, and a butadiene-styrene copolymer *(61)*.

A general conclusion was drawn from this investigation that the greater the amount of combined sulfur the less the crystallizing tendency. Data seem to show a dependence of crystallization on carbon black loading but actually any effect of the carbon black was dominated by the variations in combined sulfur which occurred.

Another investigator has shown *(62)* that the hardness of vulcanized rubber mixtures increases relatively little down to about —40°; below this it increases rapidly and is complete at —65 to —70°. The higher the sulfur content the less was the increase in hardness from 20° to about —40°, and the more rapid the increase from this to —65°. Impact resilience also shows a minimum value at a temperature which is connected with the brittle point *(63)*.

Testing and Analysis

Experimental results on the effects of oxygen and temperature on the aging of GR-S vulcanizates have indicated *(64)* that oxidation, in addition to promoting loss of strength, is one of the chief causes of the stiffening during aging. However, oxidation can also cause softening, presumably by chain scission, and at high temperatures an increase of oxygen concentration favors the softening reaction. With respect to analytical procedures, it has been claimed *(65)* that routine volumetric measurement of rates of oxygen absorption of vulcanizates can give comparisons which, for control purposes, are as adequate as those provided by standard procedures.

Since unprotected tires stored or displayed in the open will become cracked due to atmospheric ozone, tests show *(66)* that paper wrapping affords adequate protection. The superiority of neoprene vulcanizates for services involving outdoor exposure has already been demonstrated but data show *(67)* compounding ingredients do exert a definite effect. Of a variety of loading materials studied, only carbon blacks and clays were found to improve weather resistance over that of the gum stock; whiting is noticeably deleterious.

In the case of a number of synthetic rubbers, compounding with carbon black influences the deleterious effect of temperature on tensile strength, but this is accomplished merely by shifting the optimum strength values to a higher temperature *(68)*.

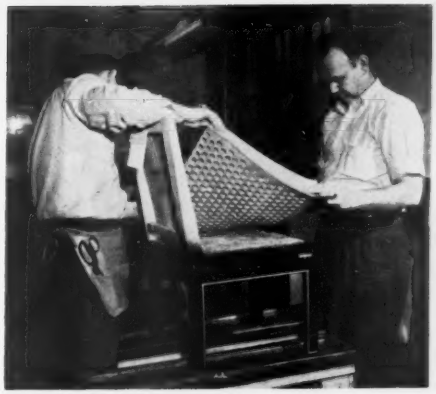
A machine has recently been developed for surveying the speed dependence of tensile strength; it is capable of recording the stress-strain curve of rubber at rates of elongation up to 9,000 times that used in the Scott tensile test *(69)*. In measuring the dynamic properties investigations show that semi-reinforcing furnace blacks or lamp blacks are preferable because the modulus of these stocks are less sensitive to amplitude and imposed static strains *(70)*.

Frequency oscillations between 0.5 kc/s have been recommended as a suitable method for measuring the dynamic elasticity of rubber compounds *(71)*. The reported large differences between the static modulus and the dynamic modulus measured at very low frequencies is explained by the fact that these differences are due to elastic after-effects of previous deformations *(72)*. A comparison of the electrical compression vibrator and the Roelig type apparatus for dynamic stiffness and hysteresis shows that the lower stiffness and higher hysteresis obtained on the Roelig test is attributed to the greater energy input per cycle *(73)*.

A modified Yerzley oscillograph has also been recommended for evaluating the elasticity and viscosity coefficients and related damping properties *(74)*. Several new types of apparatus have been designed for measuring stress relaxation under compression *(75, 76)*.

The permeability of butadiene copolymers to a given gas can be strongly reduced by the presence of acrylonitrile *(77)*. A general rule is that the presence of polar groups produces low permeability. In a study of the light stiffening of GR-S proofing data show that wave lengths longer than about 540 mu have only an insignificant effect *(78)*. Indices for the flex life and heat build-up properties of elastomers show that these properties are independent of the state of cure but dependent upon the test recipe and the dispersion of the compounding ingredients *(79)*. The use of Freon fluorinated hydrocarbon refrigerants has presented some problems in connection with the use of elastomers as gasketing materials *(80)*. However, a variety of elastomers are available and the manner in which they are affected differs greatly depending on both the elastomer and the halohydrocarbon.

With respect to the aging of rubber, the deleterious action of copper may be neutralized by tetramethylthiuram disulfide whereas fat acids increase it *(81)*. The rapid determination of small amounts of zinc in vulcanized rubber is possible by polarographic techniques *(82)*.



Numerous advancements were recorded in the field of latex foam sponge. Here Goodyear Airfoam molded cushioning is being applied to a custom-built occasional chair.

Adhesion

A newly introduced rubber-to-metal adhesive, Kalabond RM-2, is unique in that it provides a direct chemical bridge between the rubber and the metal *(83)*. Another process involves the use of a chlorinated rubber solution and a special latex *(84)*. Airless blasting has been recommended for the preparation of the metallic surface in rubber to metal adhesions *(85)*. Calcined magnesium oxide improves the adherence of insulating compounds to metals *(86)* while silica aerogel is used for brass plated steel *(87)*. A method has been described for measuring maximum stress at break along with an empirical method for estimating the blow on the bond as distinct from that exerted on the unit *(88)*. The preferred method of bonding rubbers to metals and ceramics by means of polyisocyanates involves the use of a mixture of chlorinated rubber and compounded neoprene in the adhesive *(89)*.

The continuing investigation of the adhesion of rubber to fabric has disclosed a number of materials which improve the bond. These include an alkali soluble resinous condensate *(90)*, the reaction product of HCHO and a polyhydric phenol *(91)*, an alkali metal or NH_4 salt

of polyacrylic or polymethacrylic acid *(92)*, maleic anhydride in pyridine *(93)*, a mercapto or sulfhydril compound *(94)*, carbonates and acetates of zinc, cadmium, mercury or nickel *(95)*, and casein *(96)*.

The direct adhesion of rubber to continuous filament differs widely from rubber to rubber but these differences largely disappear with the increased adhesion observed when staple fiber is incorporated in the fabric *(97)*. The importance of the control of film thickness has also been demonstrated *(98)*. A number of factors must be taken into consideration in the empirical evaluation of rubber-fabric bonding agents *(99, 100)*.

Sponge Rubbers and Latex

Within the past year perhaps the most outstanding advancement in the field of frothed latex sponge has been the production of a more uniform structure as a result of improvements in continuous frothing units *(101, 102)*. Other advancements include smaller bubble size by controlled beater speed *(103)* along with improvements in processing methods and compounding techniques *(104, 105, 106)*. Snap may be improved by the incorporation of paraffin hydrocarbons *(107)*. The incorporation of glass fibers serves as an extender and reinforcing agent and causes articles to shrink less in the mold *(108)*. The shrinkage of foamed neoprene latex prior to curing is reduced by the use of aldehyde-amine reaction products and by maturing *(109)*.

The setting of the froth may be accomplished by a low frequency alternating electric current *(110)* or by steam *(111)*, and distortion during molding may be minimized by the use of a mold adhesive *(112)*. Since the effects of copper on foamed sponge are rapid hardening and loss of resilience it is important to include a copper inhibitor in the formulation *(113)*. A good general evaluation of the quality of a foamed latex vulcanizate may be obtained by performing three types of measurements: tensile strength, compression modulus, and fatigue resistance *(114)*.

Expanded cellular rubbers have been obtained by the use of dinitrosoamino compounds *(115)*, a combination of sodium bicarbonate-fatty acid *(116)*, gas under pressure *(117)*, and water soluble granules *(118)*. Cellular products have also been prepared from isoolefine-diolefine low temperature copolymers with the incorporation of a blooming agent *(119)*. The compression properties of cellular ebonites from nitrile type synthetic rubbers are affected by several compounding variables such as amounts of sulfur, diazoaminobenzene, plasticizers, pigments and accelerators *(120)*.

A flow casting process for latex has been developed *(121, 122, 123, 124, 125)* whereby suitably compounded latex containing curing agents is poured into a plaster mold. A rubber skin forms on the plaster wall and water and the non-rubbers in solution are absorbed by the plaster. After pouring off the excess latex, the unit is dried and cured.

Rubber Pavement

The use of rubber in road construction is continuing to stimulate further investigations of technologists and engineers *(126, 127, 128, 129)*. The results of tests to date indicate *(130)* that rubber added to asphaltic paving material increases the life of the pavement, requires less maintenance, increases the elasticity of the pavement, reduces its susceptibility to temperature variations, the pavement is less brittle at low temperatures, and materially increases the coefficient of friction of the surface area. Within the past year additional experimental roads have been laid in New York City *(131)*, Singapore *(132)*, London *(133)* and Canada, Texas and Minnesota *(130)*. Rubber surfaces have also been extended to playground surfaces *(134)*, tennis courts *(135)* and airport constructions *(136)*.

It is claimed that the use of a special synthetic rubber gave excellent results because, when mixed with asphalt, it gave a wider useful temperature range than either new or reprocessed natural rubber *(31, 137)*. With this special synthetic, tests show up to 50% decrease in penetration with 5% rubber powder. The softening point has shown a 35% increase. Impact as measured by height of drop for fracture at 35°F. shows that the drop height is tripled with the use of 5% of this special rubber *(138)*.

A composition which has been used as protective sealing coats on asphaltic surfaces such as roadways, floors, etc., consists of a mixture of asphalt and a copolymer of methacrylonitrile and butadiene *(139)*. The technique used in the preparation of latex-cement floors has been improved by mixing the latex plus stabilizer, in a highly concentrated form, directly with the dry cement *(140)*.

Coating Compositions

Latex and rubber emulsion paints are now available as paints of highly acceptable quality *(111, 142, 113)*. The inherent advantages of emulsion paint systems are freedom from toxic solvents, good washability, short drying time, good application characteristics, and good shelf aging properties. With these new paints the vehicle, a butadiene-styrene copolymer, is supplied in pre-emulsified form and requires only the addition of pigment dispersions and solutions of protective colloids, sequestering agents, fungicides, etc. Paints of this type have been formulated in both flat and semi-gloss finishes and are not limited to interior applications. Preliminary results from exterior exposure tests indicate that the behavior of pigments in these emulsion paints is similar to their behavior in oil paint systems.

Investigations on coated fabrics which would be able to transmit body perspiration and to avoid heat build-up on the inside of the impermeable garment has led to the development of a water impermeable-water vapor permeable fabric *(111)*. This has been accomplished by means of a composition comprising a solid pigment with a rubber cement which functions by means of a complicated three-dimensional interconnected structure of micropores.

Rubber Derivatives

Rubberlike derivatives with a chlorine content of 1 to 17% and possessing good oil and flame resistance have been prepared by the direct chlorination of crepe rubber in carbon tetrachloride *(115)*. These products retain, to a greater or lesser degree, rubberlike properties and are capable of hot or cold vulcanization with or without the addition of vulcanizing agents. Chlorinated butadiene polymers with chlorine contents up to about 70% yield products which are capable of forming solutions of suitable viscosities and are soluble in a wide range of solvents *(116)*.

Silicone Rubbers

Silicone rubbers were initially developed to satisfy the requirements for high temperature usage but recent investigations have proven the outstanding potentialities of these products for use at extremely low temperatures *(147, 148, 149)*. Actual test results show that most of the silicone rubbers passed through a first order transition at temperatures ranging from —65 to —74°C., with consequent stiffening owing to crystallization; however,

one variety exhibited no first order transition and should have good possibilities for use at temperatures as low as —100°C.

Reclaimed Rubber

A critical survey of the evolution of different types of reclaimed rubber has led to the conclusion that the property which gives the best indication of the value of a reclaimed rubber is its aging in air at 100° *(150)*. Of the chemical compounds contained in coal tar naphtha solvent certain chemical configurations were found to be highly effective as reclaiming agents while others were inert *(151)*. Hydrogen sulfide vapor has been recommended for reclaiming butyl rubber *(152)*, while various amides, nitriles, and amines *(153, 154)* are used in reclaiming other elastomers.

Ebonites containing reclaimed rubber as a replacement in natural rubber or GR-S mixes show definite differences in properties *(155)*. In contrast to its behavior in natural rubber ebonites, the reclaim in the GR-S mix has not reduced the unnotched impact strength, cross breaking strength, or elongation, so that the GR-S/reclaim ebonite is at least equal to the natural rubber/reclaim ebonite whereas in the absence of reclaim, GR-S is inferior to natural rubber.

Apparatus and Machinery

A new machine for curing tires, the "Bag-O-Matic," with one sequence of operation, bags, cures, and debags *(156)*. Not only does the Bag-O-Matic combine these operations, but it does them in approximately one half the time normally required on the three units. High frequency dielectric heating is recommended for homogeneous rubber stocks and for large masses of homogeneous material but investigation shows *(157)* that many stocks, particularly carbon black stocks, do not possess uniform electrical properties. Controlling heat losses is an important factor in molding operations because the temperature drop of a mold during the loading and unloading portion of the curing cycle and the time required for the mold to return to platen temperature are sources of variation in the physical properties of the vulcanizates *(158)*.

In the use of the Banbury rubber mixing machine it is claimed that one of the most important principles is to arrange conditions so that the stock is quite stiff during the period that pigments are being dispersed in the rubber *(159)*. In the design of an extruder for rubber and plastics it has been pointed out *(160)* that no extruder should be considered as a universal machine because a number of conditions are involved which affect the extruder performance. With respect to molding techniques, a resinous styrene interpolymer coating for metallic forms *(161)* and a spacer or mold surface *(162)* for the vulcanization of rubber have been introduced.

A non-contacting thickness gauge employing beta ray emitting isotopes has been developed *(163)* which makes possible weight per unit area or thickness measurements on materials which are accessible from only one face or on materials which are superimposed on other substances provided that an atomic number difference exists between the two materials. Measurements can be made on rubber or plastic compounds, or the total weight per area of rubber coated fabrics while setting on the surface of a calendering roll.

Rubber-Plastic Blends

High styrene resins, which have already acquired recognition because of their reinforcing efficiency, are expanding their usage in rubber compounding by improvements in processibility *(164, 165, 166)*. Reinforcement of various physical properties of rubber has also been obtained by the addition to the latex of various synthetic resins, such as resorcinol-formaldehyde, at different stages of condensation *(167)*. Another type of plastic-rubber blend, whose properties indicate that it is probably a phenolic thermosetting plastic with Buna N, can be produced in varying degrees of flexibility ranging between elastic soft rubber and brittle hard rubber *(168)*.

The use of rubber in road construction was expanded considerably in the past year. This view shows a rubber-asphalt compound being installed on an Akron street.

Other Applications of Rubber

The durability, waterproofness, and abrasion resistance of leather can be increased by impregnation with a solution of natural or synthetic rubbers *(169, 170, 171)*, and then vulcanizing with an accelerator of the dithiocarbamate type. Rubberized coatings can now be applied to all the underneath parts of the car body, and the noise from flying stones can be effectively deadened *(172)*. The inside of the hood can also be treated with this rubberized coating so that engine noises are muffled and vibration is lessened. Since rubber bearings have been widely used in marine service, tests have been developed for the measurement of their coefficient of friction and wear *(173)*.

By the suitable selection of elastomers and compounding ingredients, materials for bearings with lower coefficient of friction and longer life have been developed. Rubber crimping is shown to be applicable to the assembly of thin-walled metal tubes or other parts, especially in products using fluid actuation *(174)*; this process enables tighter joints with low residual stress. Modifications have been made in the tread design and composition of tires for the purpose of improving traction and wear *(175, 176, 177)*.

A fabric for tires, belts, etc., which does not stretch unduly at room temperature comprises a material which consists of a weft yarn of polyethylene, halogenated, oxidized or cyclized derivatives of rubber, cellulose ethers, or lightly cured rubber thread *(178)*. A wire fabric tire casing has been designed which may be operated at substantially the same inflation pressures as tire casings of like rating using conventional textile fabric *(179)*.

With respect to rubber spring units a study has been made of the static and dynamic properties of various natural and synthetic rubbers whereby certain general relationships were found *(180)*. A nomograph has been

constructed and a technique developed for the application of these ratios.

A study of the gasketing problem on liquid-filled electrical apparatus has led to the conclusion that nitrile rubber is the most promising type of compound for such gasket applications *(181)*. For improving the covering of wire with plastic or rubber an automatic extruder control has been developed which makes it possible to control the speed of the wire through the extruder and produce wire to close tolerances *(182)*. Evidence has been presented that some of the failures of non-leaded rubber insulated underground cables have been caused by living microorganisms *(183)*. Natural rubber compounds were the most susceptible while in some soils GR-S compounds proved stable up to two years but failed in a more active soil.

The observations, that if a sample of conductive rubber-carbon black mix is placed between two metal electrodes at different potentials the intensity of the current across the sample varies considerably as a function of the pressure applied by the electrodes to the surface of the sample, has been extended to applications requiring a modulation of electrical current by mechanical vibrations as in the electro-acoustic field *(184)*.

Latex films, to which corrosion inhibiting materials such as sodium benzoate and sodium nitrite have been added, have been used to protect steel parts during transportation and storage *(185, 186)*. In a study of the use of polyethylene in contact with rubber in applications which involve rubber grommets as a part of an assembly where polyethylene film is used for a moisture impermeable cover and in electrical applications where rubber components and polyethylene are used jointly, conclusions are drawn that GR-S compositions are unlikely to have any adverse effects but compositions based on more oil resistant rubbers may produce deterioration of the polyethylene *(187)*.

Rubber Metabolism

Although extensive research has been conducted in the field of rubber for many years the mechanism of rubber metabolism is still an unsolved problem. Since isoprene has never been found in plant tissues investigators have attempted to discover the particular organic substances that serve as precursors of the isoprene unit. One investigator has based his work on the view that pyruvic acid and acetone undergo condensation to furnish a C_6 hydroxy "acetone pyruvic acid," which leads to an unsaturated C_5 alcohol or a saturated C_5 glycol that plays a significant role in isoprenoid syntheses.

Another investigator *(189)* believes that the reaction of acetone and acetic acid to give betamethyl-crotonic acid is involved in rubber formation. A theory has also been proposed that the synthesis of rubber probably takes place mainly in the green parts of the plant and principally directly from carbon dioxide which is reduced to isoprene among other products *(190)*. According to this theory, freshly synthesized rubber is present in the plant in the liquid state.

If the problem of the mechanism of rubber metabolism can be solved, and if these conditions can be duplicated in the laboratory, this will represent a definite long step toward the solution of plantation rubber problems.

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G-E High-Potential Tester

Developed for the electrical testing of insulating materials, the Current Limited High-Potential Tester produced by the Special Products Division of the Apparatus Department of the General Electric Co., Schenectady 5, N. Y., is particularly suited to the testing of electrical components and assemblies, such as coils, relays, motors and appliances. Special applications of the instrument have been made for detecting flaws in surface coatings of paint, lacquer, and sheet materials of a non-conducting nature. An indicating meter measures crest value of voltage on samples tested regardless of wave shape, internal voltage drop, or variation in line voltage.

The Current Limited High-Potential Tester is enclosed in a metal cabinet with a convenient carrying handle. It operates from a power supply of 105 to 125 volts a-c of 60 cycles. It is available in either single or dual range models. The single range model has an output of 0 to 3200 volts rms. The dual range model has an 0 to 1600 volt range in addition to the 0 to 3200. For odd frequencies and higher voltages, special models can be made. The primary circuit uses resistance and a potentiometer to supply an adjustable voltage to the primary of the transformer and to damp out line surges.

Data is currently being compiled for the 1951 RUBBER RED BOOK. Make sure that forms are returned promptly to assure accurate listings.

Editorials . . . . . .

Rubber Specs Pending

EVERY rubber man with an ear close to the ground in the Washington area knows that the re-institution of specifications on all types of end rubber products is in the offing. If any definite confirmation of this pending program is needed, it is to be found in President Truman's recent State of the Union message. It will be recalled that the President told Congress that the defense program will result in "heavy cuts in the civilian use of copper, aluminum, rubber, and other essential materials."

NPA officials have been holding meetings with various committees representing the different branches of the rubber manufacturing field. Thus far, it is learned from reliable sources, tentative limits for natural rubber have been set for two product groups, namely, rubber footwear and insulated wire and cable. Manufacturers in the first category will probably be limited to a total of 70 percent of natural rubber in rubbers, tennis shoes, and the like, while producers of wire and cable may be held to a maximum of 20 percent. The use of natural rubber in tires, currently restricted to 65 percent under Order M-2, will be cut still further.

Some talk is heard in the Washington corridors concerning a complete ban on the use of natural rubber in some products, particularly the luxury type of goods. This action would be similar to that which was put into effect in 1942 when the use of natural rubber was banned in the manufacture of balloons, wire braid hose, hard rubber syringes, vacuum cleaner belts, dental dam, etc. NPA officials, however, have expressed considerable doubt as to the need for such drastic action, and there is little likelihood of its being put into effect unless the government's importing program falls far short of its goal.

At the moment NPA is depending upon its across-the-board limitation to hold the rubber line. The overall limitation currently in effect restricts rubber manufacturers during January to 82 percent of their total new rubber use during the last four months of 1950 and 51 percent of their natural rubber consumption in that period, while the allowable percentages for February will be 80 percent and 43 percent, respectively. The major objective is to hold total new rubber consumption to 90,000 tons a month. The percentage figures for March will probably cut natural rubber use still further.

There is considerable argument for eliminating the across-the-board limitation on the industry and allowing total product specifications to do the entire job of controlling consumption. This is the policy which worked with satisfactory results during World War II. Product specifications protect the "single-purpose" rubber manufacturers from unfair competition on the part of "multiple-purpose" manufacturers, in that all rubber products are restricted to a maximum natural rubber content. This reasoning is the guiding principle in the current tire specifications, over and above the conservation angle.

In view of the climbing rate of synthetic rubber production, actually what the rubber manufacturing industry faces is not a shortage in supply of new rubber but rather a slight reduction in quality of end products. This quality angle will not apply to all products by any means, since synthetic rubber may frequently replace natural rubber without any deterioration of product quality or performance and, in fact, may improve such performance. An article on the use of rubber by the U. S. Navy in this issue seems to bear out this statement. On the other hand, there are many rubber products which fall off in quality when synthetic rubber replaces natural rubber.

Although some of the synthetic rubber facilities now under reactivation are slow in getting started, the production of GR-S is climbing rapidly and at this writing has reached a 40,000-ton-a-month rate. Rubber has already started to roll from the Louisville, Los Angeles and Akron installations, while the Institute unit is just about ready to go into production. The reactivated plant at Port Neches has been producing GR-S for the past two months.

One fact frequently overlooked in the current synthetic rubber program is that reactivation efforts have resulted in increased capacities. In addition, capacities of going plants have been increased somewhat by the installation of additional reactors taken from an unfinished unit on the West Coast. Twelve of these reactors were recently installed in the Houston unit, six at the Baton Rouge plant, and seven at Naugatuck, Conn. Because of these factors, there is some talk in Washington of increasing the across-the-board limitation of 90,000 tons consumption per month.

CURRENT NEWS OF THE MONTH

GSA NAMED SOLE NATURAL RUBBER IMPORTER UNDER NEW CONTROLS ESTABLISHED BY NPA

IN order to assure the flow of natural rubber into the United States through a single channel, the National Production Authority, on December 29, 1950, in an amendment to its Order M-2, appointed the General Services Administration as the sole importer of natural rubber and natural rubber latex. Natural rubber latex, however, was temporarily suspended from the provisions of the order on January 7, for the month of January. Under the amendment of December 29, GSA will act as the Government distributing agency, meeting stockpile requirements and, on the basis of NPA allocations, reselling rubber to industry. Rubber thus becomes the first product to be exclusively purchased and distributed under Section 303-A of the Defense Production Act of 1950 which authorizes the purchase of metals, minerals and other raw materials by the Government for Government use or resale. NPA, with the approval of the chairman of the National Security Resources Board, found the exclusive rubber buying program necessary "to safeguard the supply of rubber and to assure that it is distributed and utilized most advantageously to the national defense." (EDITOR'S NOTE: The full text of the order making the Government the sole importer of natural rubber will be found on the next page.)

According to Jess Larson, General Services Administrator, all new contracts for the importation of natural rubber are prohibited, but existing contracts will remain in force unless they are found to interfere with the operations of the exclusive buying agency. Mr. Larson said the Government recognizes its responsibilities and obligations to the rubber industry. To assist GSA in arranging the most economic methods of importation, all consumers of rubber will be asked to submit a detailed list of their requirements, including tonnage, types of grades, and ports of entry, as far in advance as possible.

All rubber furnished by the Government to industry will be made available at ports. Thereafter, it will be the purchaser's responsibility, either directly or through a forwarding agent, to take delivery of the rubber either on the piers or f.o.b. warehouse, as the case may be. Mr. Larson stated that all existing facilities of the rubber industry and the trade will be used to the maximum extent possible. "Our objective is to complete the transition as early as possible in conformity with established practices to the extent permitted under the circumstances," he said.

Only guayule, balata and gutta percha are exempt from the new Government order and can still be purchased privately. It was explained that these are highly specialized types of rubber for which private companies have made very long-term arrangements. Moreover, the amounts involved of these various types are relatively small.

Another slight exception is that private importing might be "specifically authorized in writing by GSA," in a very few cases. An official said a possible example might be where a private broker with very good contacts could get some rubber the Government couldn't get, or could get it at a better price.

Active Trading Ended

The Government's action in taking control over natural rubber had the effect of terminating active trading for this commodity. The Governors of the Commodity Exchange in New York City, on January 2, 1951, ordered that trading in rubber futures be confined to the liquidation of open-interest contracts and set the date for full liquidation as March 31, 1951. The Exchange acted in conformity with a request made by Mr. Larson.

After a meeting held with dealers and manufacturers on January 5, GSA announced that it will price the natural rubber it sells to industry on a day-to-day charge-out basis during the first quarter of this year. GSA has placed in the mail a schedule listing the various lots (by warehouse location and grade) included in the 43,000 tons of rubber it will sell to industry from the defense stockpile in the January-March quarter.

Manufacturers will pay for each grade the average procurement cost incurred by GSA in buying the equivalent amount of the same grade on the previous business day. To this price will be added a small charge to cover the delivery cost entailed in replacing the lot, though not necessarily in the same warehouse from which it was sold.

The daily price for each grade will be known on the first telephoned inquiry to GSA each day. The 43,000 tons of stockpile rubber are being offered according to established policy of rotating rubber, moving older rubber out of storage and into use and replacing it with stock. This is designed to prevent quality deterioration of the stockpile. The 43,000 tons will be augmented by rubber coming into GSA's hands in February and March. Authorized use is about 110,000 tons for the quarter.

A manufacturer can buy a particular lot either by approaching GSA directly or through a dealer acting for him. After agreeing to buy, he will have three days in which to inspect the lot at the particular warehouse location. GSA announced on January 5 that it will confine future rubber policy discussion to meetings with a joint dealer and manufacturer industry advisory committee which it intends to appoint shortly. From early December, when GSA first disclosed plans to take over exclusive buying and resale of imported rubber, the agency has met with ad hoc industry groups.

GSA has informed importers of natural rubber latex that they may continue to buy and sell spot latex during January. This instruction, to be formalized shortly in an ammendment to NPA Order M-2, amounts to a selective and temporary suspension of the blanket ban, announced on December 29, against further private imports of natural rubber.

Over the next few months, GSA will draw up a new method of pricing rubber for resale other than the daily charge-out basis resorted to for the present. This will be done in collaboration with the Economic Stabilization Agency, other defense agencies and the GSA industry advisory committee. GSA will also bring in industry men to help administer the purchase and distribution plan.

GSA indicated also it will scrutinize carefully all long-term or special natural rubber delivery contracts, in addition to all regular contracts made before December 29, 1950. Such contracts would include agreement of a rubber company to supply a subsidiary's natural rubber requirements over a long-term period. "We will want to look at them, before giving our approval," a GSA official said. Contracts were to have been registered with GSA by January 5.

Quaker Rubber Plans Expansion

H. K. Porter Co., Inc. of Pittsburgh, Penna., has announced an immediate $1,500,000 expansion at the plant of its subsidiary, the Quaker Rubber Corp. at Philadelphia, Penna. The expansion will increase finished products capacity by 30%. Seventy percent of the expenditure is earmarked for new equipment.

COMPLETE TEXT OF THE RUBBER IMPORT CONTROL ORDER

Following is the official text of the General Services Administration order interpreting and implementing GSA's exclusive authority to control the importation of rubber into the United States:

Chapter X—General Services Administration

Subchapter A—Purchase, commitments to purchase, for Government use or resale.

Part 1440—Rubber
IMPORTATION OF RUBBER

Sec.
1400.1 Purpose.
1440.2 Interpretation and implementation.
1400.3 Responsibilities and functions.

Authority: 1400.1 to 1400.3 issued under Sec. 303 of the Defense Production Act of 1950; Sec. 303 of Executive Order 10161 of Sept. 9, 1950; and National Production Authority Amendment to Rubber Order M-2 of Dec. 29, 1950.

1400.1 Purpose. This part interprets and implements the exclusive authority of the Administrator of General Services to control the importation of crude natural rubber and natural rubber latex (excluding guayule, balata and gutta percha) into the United States as established by the Administrator of the National Production Authority in amendment to Rubber Order M-2 of Dec. 29, 1950 (Part 25 of this Title, Supra), and outlines the attendant responsibilities and functions of the Administrator of General Services in purchasing such crude natural rubber and natural rubber latex for Government use and resale.

The Administrator of the National Production Authority has issued on Dec. 21, 1950, a certificate pursuant to Section 303 of Executive Order 10161 as to the necessity for purchase of crude natural rubber and natural rubber latex. The United States, as used herein, includes its territories and possessions.

1400.2 Interpretation and Implementation. In accordance with the amendment to Rubber Order M-2, referred to in 1400.1, the Administrator of General Services is given the exclusive control of importation into the United States of crude natural rubber and natural rubber latex (excluding guayule, balata and gutta percha), and no person, except as authorized in writing by said Administrator, shall purchase for import, offer to purchase for import, receive, or offer to receive on consignment or make any contract or other arrangement for the importing of, any crude natural rubber or natural rubber latex:

Provided, however, that all outstanding contracts made by a private person, whether as owner, purchaser, seller, or consignee of such crude natural rubber or natural rubber latex, or agent of any of them, prior to Dec. 29, 1950, which require importation into and/or delivery within the United States of crude natural rubber or natural rubber latex are hereby authorized to be fulfilled or liquidated (including liquidation of open contracts outstanding at the close of business on Dec. 29, 1950, on Commodity Exchange, Incorporated, of New York city, through trading on such exchange, but only until the close of business of said exchange on March 31, 1951); and provided further, (A) that all such contracts shall be registered with the Administrator of General Services, Attention, Emergency Procurement Service, 7th and D Streets S. W., Washington 25, D. C., on or before Jan. 5, 1951; (B) that the foregoing authorization shall apply only to the particular material and shipment mentioned in said contracts; and (C) that the Administrator reserves the right to disapprove importations and/or deliveries under said contracts if he should determine that any contracts requiring such importation, and/or deliveries, because of their duration, special nature, or otherwise, interfere with the operations of the rubber program to be established or are contrary to the policies formulated thereunder.

1400.3 Responsibilities and Functions. The crude natural rubber and natural rubber latex will be purchased by manufacturers and rubber dealers as authorized by the Administrator and will be distributed at the port of entry into the United States by tranfer to the national stockpile under the Strategic and Critical Materials Stock Piling Act of July 23, 1946, or by resale to rubber consumers for their own use and not for further resale.

The sales to rubber consumers will be made in the quantities and to the consumers designated by the Administrator of the National Production Authority, pursuant to his authority under Title I of the Defense Production Act of 1950 to allocate materials and establish priorities, to the extent that he may exercise such allocation authority.

Dated: Dec. 29, 1950.

JESS LARSON,
Administrator.

Bulletins on Teflon Available

The Fabrics and Finishes Department, Chemical Division, E. I. duPont de Nemours & Co., Inc., Wilmington 98, Delaware, has made available a number of bulletins on various Teflon products. Teflon is the name given to the company's polytetrafluoroethylene materials. Recommendations for specific applications are given in each bulletin. Among the bulletins currently available are the following: (1) Teflon Finishes, (2) Teflon Wire Enamels, and (3) Teflon Coated Glass Fabrics, Tapes and Laminates. Copies are available from the company on request.

Dayton Rubber Arranges Loan

Dayton Rubber Co., Dayton 1, Ohio, has arranged to borrow $4,000,000 from the Equitable Life Assurance Society on a 3½% promissory note due December 1, 1965. The note is subject to reduction by a sinking fund beginning on December 1, 1954. Lehman Brothers of New York arranged the sale. The company will use the money to pay off $2,865,000 of debentures held by Equitable and to increase working capital.

Lug Height Effect on Farm Tires

According to recent tests conducted by the U. S. Department of Agriculture in conjunction with the U. S. Rubber Co. at Auburn, Ala., the height of the lug makes a difference in the way a farm tractor tire performs. The width of the rim seems to have little to do with performance. However, the Agriculture Department said its tests covered only three types of soils and tire treads. Four-ply tractor tires of the 11-38 size were used. They had simple angular lugs and were inflated with 12 pounds of air. Lug heights varied from one-half to one and three-quarter inches. The tests indicated that soil type and lug height work in combination. In loose sand, the low lug type did better than those with higher lugs. In loams, the low lug type proved best but only by a small margin. In clay, over-all performance was about the same. No appreciable changes could be noted in tests of different rim widths. The Agriculture Department stated that tires on narrow rims performed slightly better in sand than tires on the wider rims. Rim width had practically no effect on performance in loam. In well packed clay, tires on the wider rims had lower travel efficiency but better over-all performance.

SPE Plans New York Meeting

The Society of Plastics Engineers, Inc., will hold its Seventh Annual National Technical Conference on January 18 to 20 at the Hotel Statler in New York. An integrated program of technical papers will be presented at both morning and afternoon sessions, all built around the conference theme, "Plastics Shape the Future." In addition to these technical sessions, the conference will feature the SPE annual luncheon and business meeting on January 18, the election of national officers for 1951, the presentation of awards to winners in the Society's Prize Paper Contest, and the annual banquet on January 19. The banquet will feature an after-dinner talk by John P. Coe, vice-president and general manager of the Naugatuck Chemical and Synthetic Rubber Divisions of the U. S. Rubber Co. The conference is being sponsored jointly by the Society's New York and Newark, N. J., sections.

Installs "Mechanical Noses"

"Mechanical noses" have been installed in a number of places in the various plants of the Goodyear Tire & Rubber Co. at Akron, Ohio, to safeguard personnel and property. These "noses," more prosaically known as combustible gas alarms, are devices developed by the Mine Safety Appliances Co., of Pittsburgh, Penna. Functioning 'round-the-clock, day in and day out, they are located in such places as the dryers in the Pliofilm plants, at the post-dip calender unit drying towers in the tire plants, and, more recently, at the "tank farm" at the Goodyear synthetic rubber plant. The function of the "noses" is to detect, and to give warning, of the presence in the atmosphere of combustible gases before they can reach dangerous or explosive concentrations.

NPA CUTS NATURAL CONSUMPTION 28% IN JANUARY AND FEBRUARY

As the December issue of RUBBER AGE went to press, the National Production Authority issued an amendment (on December 11) to Order M-2 designed to reduce natural rubber consumption by 28% in January and February from the November level. Total civilian rubber consumption, however, will remain at approximately 90,000 tons a month by the use of increasing supplies of synthetic rubber. The amended order requires that camelback be produced during January and February in the same proportionate rate to new rubber consumption as was produced during the year ended June 30, 1950. This will provide material for a major conservation effort in rubber through the recapping of present tires.

It was explained that a new passenger car tire of popular size requires 11 pounds of new rubber plus fabric and bead wire, while a retread job which will often double the life of a tire requires only five pounds of camelback, of which 5% is natural rubber, said NPA. The amendment continues the same principle used in the order covering November and December, along with provisions requiring that certain amounts of synthetic rubber be used in tire manufacture.

The amended order provides that no person shall consume during either January or February a total amount of new rubber (including all synthetic, both dry and latex, and all natural, except latex and rubber from guayule) in excess of 82 percent of his base monthly rubber consumption in January and 80 percent in February. New rubber used for Defense Department orders is not included in this limitation.

Base Monthly Consumption

The base monthly consumption represents one-fourth of the amount of total new rubber consumed by the user during the last four months of 1950, or as adjusted under provisions of the previous order. No person shall consume natural rubber (exclusive of natural rubber latex and rubber from guayule) in January in excess of 51 percent, nor in February in excess of 43 percent, of his base natural rubber consumption.

The base monthly consumption will represent one-twelfth of the user's actual consumption of natural rubber during the year ending last June 30. If the user's maximum total new rubber consumption for the last four months of this year was adjusted under provisions of the previous order, his base monthly natural rubber consumption will be adjusted by the same percentage as his permitted new rubber consumption was changed.

Other provisions of the order are substantially the same as before. The present order allows for consumption of about 6,000 tons of natural rubber latex a month. NPA indicated, however, that this consumption probably will be reduced to 5,000 tons a month starting in March.

Due to a breakdown of the facilities at the Torrance, Calif., butadiene plant, attributed to valve difficulties, NPA was forced in mid-December to curtail December allocations of GR-S by 13%. The cutback was forced by a ten-day loss of production at the Torrance unit. The cut applied only to the December allotment. The Torrance plant is scheduled to produce approximately 15% of current butadiene production.

There are some reports current concerning difficulties affecting output of the butadiene units at Houston, Akron and Louisville, particularly with regard to shortages of butylenes, but RFC officials claim that these difficulties are non-existent and the agency expects to fulfill its full obligations in the future.

A. G. Spalding & Bros., Inc.

Year ended October 31: Consolidated net income of $1,623,384, which is equal to $3.12 a share, increased from $944,827, or $1.81 a share, in the previous fiscal year. Net sales in the 1950 fiscal period amounted to $22,830,880, against $20,967,362 for the year ended October 31, 1949. Net working capital on October 31, 1950, was $10,180,290, compared with $9,427,506 a year earlier.

Blow Heads Development Unit

Dr. C. M. Blow, one of the group of British scientists who attended last October's Cleveland international rubber meeting, has recently been appointed Superintendent of Rubber Technical Developments, London, England, succeeding J. P. Griffiths. Dr. Blow comes to his new position after two years as Superintendent of Applied Research at the British Rubber Producers' Research Association. Rubber Technical Developments is a unit formed last year by the British Rubber Development Board and British Rubber Producers' Research Association to promote and develop the increased use of natural rubber. At the Rubber Technical Development laboratories, installation of new equipment is now nearing completion. This will enable new processes to be taken from the laboratory stage to commercial production, and it is hoped that a considerable saving of time in development work will thereby be achieved.

Questionnaires for the 1951 RUBBER RED BOOK should be completed and returned without delay!

AIR FORCE DEVELOPS 20-MAN RUBBERIZED NYLON LIFE RAFT

The Aero Medical Laboratory of the Air Materiel Command of the U. S. Air Force at Wright-Patterson Air Force Base, Dayton, Ohio, has announced the development of a new 20-man life raft made of rubberized nylon. The raft comes complete with canopy, radar reflector and accessory kit, all wrapped in an 18 by 36-inch unit. Designed especially for ditching operations, the new raft can be tossed from a plane and inflated in approximately one minute.

Built for the Air Force by the Air Cruisers Co. of Clifton, N. J., the raft itself has no conventional top or bottom. Made from two rubberized nylon flotation tubes with a floor section in between, there is no danger that the raft can inflate upside down in the water since both sides are identical. Each tube is capable of independently supporting 20 men and if one is damaged an equalizer valve between can be shut off, thereby saving the remaining tube. An inflatable center bubble under the raft supports its floor 8 inches above the water's surface.

The craft itself weighs 49 pounds; its canopy and accessory kit 89 pounds. The rubberized nylon canopy is dyed a high visibility neon red, and is equipped with a drain to catch rain water. The inside of the raft is painted sea blue to aid downed airmen in camouflaging their craft in unfriendly waters. The accessory container is attached to the raft and contains a full line of rations, medical supplies, repair and emergency equipment and other necessary paraphernalia.

SYNTHETIC OUTPUT INCREASES AS REACTIVATION PROGRAM PROGRESSES

Defense plans for the synthetic rubber industry are being rapidly translated into significant increases in production and employment, Robert C. Goodwin, executive director of the Office of Defense Manpower, recently reported to Secretary of Labor Maurice J. Tobin. Between January 1, 1950, and October 31, 1950, production of synthetic rubber increased from an annual rate of 335,000 long tons to 525,000 long tons.

The Government-owned synthetic rubber plant at Akron, Ohio, reactivated by the Goodyear Synthetic Rubber Corp., began production on December 20, 1950. Idle for the past 42 months, the plant will add 55,000,000 pounds of synthetic rubber to the Government's production in 1951. Russell DeYoung, vice-president in charge of production for the Goodyear Tire & Rubber Co., stated that 18 of the plant's 34 polymerizers have already been placed in operation with the remaining units scheduled to start next month.

Mr. DeYoung estimated the plant's output at 200,000 pounds during the first month of operation, with continuous production increasing until a 150,000 pound output per day is attained. In getting the plant ready for resumption of operations, Mr. DeYoung pointed out, it was necessary to replace considerable equipment which had been disposed of through the War Assets Administration following the Government's decision to cease operations in May, 1947.

In addition, the order reactivating the plant issued in mid-September, specified a complete change-over from dry rubber, originally produced, to latex. This required installation of additional equipment, all of which was completed within the 90-day schedule set up by the Government.

George R. Lyon, production manager of Goodyear's Government-owned synthetic plants in Akron and Houston, Texas, said personnel, which will approximate 150 persons, have been selected from employees in Goodyear's own synthetic plant, or from manpower employed during the war at the plant.

R. C. Stell, present manager of the Goodyear Synthetic operations, has been named plant manager of the reactivated Akron unit; H. R. Sontag, technical superintendent; H. W. Brown, manager of engineering and maintenance; V. M. Robinett, manager of materials and traffic; R. O. Lees, works accountant; W. E. Kavenagh, manager of plant safety; E. E. Barron, purchasing; and C. W. Beamer, personnel.

Other Progress Reported

Reactivation of the Government-owned synthetic rubber plant at Institute, W. Va., by the B. F. Goodrich Chemical Co. is also proceeding according to schedule. In stand-by since 1947, the plant is undergoing a complete overhaul and modernization. Goodrich Chemical, the new plant operators, took over the plant from the U. S. Rubber Co. on November 1, 1950, following notification from the Reconstruction Finance Corporation.

The Institute copolymer plant is constructed in units of 30,000 long tons, each with its own pigment preparation, polymerization, recovery and finishing operations. The plant has a total capacity of 90,000 tons. The first production units were scheduled to begin operation on or about January 1, with remaining lines in production by March. Approximately 800 persons will be employed at the plant when it is in full operation. Key operating and technical personnel came to Institute from other previously Goodrich-operated plants at Port Neches, Texas, and Louisville, Ky. Tom B. Nantz is plant manager.

Start of production in the $7,000,000 Government-owned synthetic rubber plant at Louisville, Ky., operated by the Kentucky Synthetic Rubber Corp., has also been announced. Capacity of the plant, which had been closed since April, 1947, is rated at 2,500 long tons of GR-S monthly. Kentucky Synthetic, composed of ten non-tire rubber manufacturing companies, contracted with the RFC for the reopening and the operation of the plant last September. The plant had been scheduled to begin operations by January 1, 1951.

Thomas Robins, Jr., president of Kentucky Synthetic, as well as president of Hewitt-Robins, Inc., one of the participating firms, said, following a board meeting of the 10 participating firms, that the firms plan to remain in the synthetic rubber business even after the present emergency. Mr. Robins said that Kentucky Synthetic plans to embark on a research program aimed at developing new types of synthetic rubber for possible future uses in non-tire products. In this connection, he added, it is planned to ask the Government to reopen a pilot plant adjacent to the facilities for research purposes.

Predicts 60% Synthetic Use

In a recent address at Trinity College, Hartford, Conn., Dr. Waldo L. Semon, director of pioneering research for the B. F. Goodrich Co., stated that plants recently reactivated for the manufacture of synthetic rubber will supply 60% of all the rubber used in the United States by March, 1951. Technical teams furnished by private industry already have rushed 9 standby Government plants into operation, he said, while others are scheduled to be reopened and in production early in 1951.

Dr. Semon predicated that synthetic production will hit an annual rate of 760,000 tons by spring, but declared that in the event of war an even greater production will be needed. The weak spot in the otherwise optimistic rubber outlook is the shortage of raw materials needed to make man-made rubber, according to Dr. Semon. "Styrene, originally produced chiefly as a raw material for the manufacture of man-made rubber, now is being used in making plastics for molded articles," he said. "By-product butylene, from the large cracking plants making gasoline, is being converted largely to high octane gasoline and is no longer readily available for making butadiene. The incidental chemicals required are in short supply also."

To partially offset this shortage, coal tar benzene is being imported from England and western Europe to increase the output of styrene, the Goodrich scientist said. Government plants to produce butadiene from grain alcohol are being reopened but the need for alcohol is so great that it is being imported from France.

In discussing government plans to dump from 65,000,000 to 70,000,000 bushels of price support potatoes, Dr. Semon recommended that they be converted instead into 45,000,000 to 50,000,000 gallons of alcohol. "Cull and surplus potatoes always should be considered as a source for industrial alcohol and, incidentally, for man-made rubber in an emergency," he said.

Domestic Rubber Production

Dr. Semon pointed out the possibility of producing natural rubber, at a profit, within the boundaries of the United States. He said the production of natural rubber cheaply and competitively is a challenge similar to, and as real a need, as the cheap domestic production of sugar from beets.

The Russian dandelion will produce up to 200 pounds of rubber per acre per year on good farm land, according to Dr. Semon, and selective breeding might increase this yield. Given mechanized equipment for planting, cultivating, harvesting and extracting the rubber, the rubber-yielding dandelion might become a profitable farm crop. Dr. Semon indicated that the Guayule shrub, yielding excellent rubber, can be grown on many submarginal lands. On large areas of land suitable only for dry land farming it is believed that a crop of 1200 pounds of rubber per acre could be harvested every five years.

Recently, the General Tire & Rubber Co. offered the RFC a new development which was said to be capable of increasing GR-S production by 22%. This development would have the effect of minimizing dependence on alcohol-butadiene and would partially alleviate shortages of alcohol and benzene. To date, officials of General Tire and the RFC have not commented upon the offered plan, but there have been many guesses as to the nature of the process and whether it is patentable or not.

One suggestion has been made that the process involves a petroleum residue which is added to a carbon black-synthetic latex mixture. Such a residue has vulcanizable double bonds, will act as a softener, and is essentially a cheap by-product of cracking operations. Heavy liquid residue, containing aromatic unsaturates, can be polymerized to resins which sell for 5 to 7c a pound. Negotiations have been going on for several weeks between General Tire and the RFC and some decision is expected shortly.

Benzene Program Pushed

The general problem of shortages of benzene caused the National Production Authority, on December 14, to ask a group of benzene producers and consumers to move ahead with plans for producing synthetic benzene from petroleum.

NPA earlier had warned its benzene advisory committee that the United States must find new sources, but that it may be late in 1952 before substantial quantities can be developed from petroleum. Most of the benzene produced now is developed as a by-product of coking processes.

It was reported that the special task force, selected from members of the committee, will study supply and demand prospects for the next five to ten years. This in turn will be the basis for deciding what "heavy investments" will be needed to finance new and converted plants for synthetic production. Industry spokesmen pointed out that "even if no emergency existed," there would be a strong need for new sources of the chemical. It was estimated that by 1955 nearly twice the present production will be needed.

Conversion Into Styrene

Most of the 207,000,000 gallons of benzene expected to be produced and imported to this country during 1951 will be converted into styrene for synthetic rubber. Over-all 1951 demand, including use in plastics, aniline, nylon, DDT and other products, is expected to stand at about 220,000,000 gallons. The Government, at the behest of the benzene group, is expected to expedite agreements with European nations whose brokers were said to be holding off for high prices.

Other suggestions made by industry for increasing the benzene supply include:

(1) Refinement of some motor grade benzene into chemical grades.

(2) Substitution of petroleum products for benzene.

(3) Eventual increase resulting from coke operations in the steel expansion program, and,

(4) Prompt completion of a Bureau of Mines survey on what additional benzene can be recovered from coke ovens by improving processes.

Named French Alcohol Agent

Commercial Solvents Corp., New York, N. Y., has been named as agent for the Reconstruction Finance Corporation to expedite the movement from France to the United States of approximately 100,000,000 gallons of ethyl alcohol. Delivery is to be made during 1951. Arrangements to purchase this material by the United States Government from the Government of France were completed in October, 1950, as reported in RUBBER AGE. This alcohol will be used in the manufacture of butadiene for synthetic rubber.

Reports from France state that there will be no difficulty in supplying the required amounts of alcohol. The only bottleneck could be a shortage of tankers to transport the alcohol to U. S. ports, and this would be more a problem for the United States than for the French.

In another attempt to relieve alcohol shortages, legislation clearing away some of the legal obstacles to the use of beverage spirits for industrial purposes was approved by the House of Representatives on December 19, 1950. The bill permits the removal of distilled spirits from registered distilleries, internal revenue bonded warehouses, industrial alcohol plants and industrial alcohol bonded warehouses to any other such facilities for any purpose deemed necessary to meet requirements of national defense. It also permits the withdrawal of distilled spirits of 160 degrees of proof or more for any tax-free purpose and also lifts the restrictions on hours for distilling and rectifying spirits.

Six new training booklets for foremen and supervisors, called the "Psychology of Safety in Supervision," have just been issued by the National Safety Council. Complete sets are available from the Council at 425 N. Michigan Avenue, Chicago 11, Ill., for nominal fees.

Coming Events in the Rubber Industry

Jan. 26. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Jan. 26. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Jan. 30. Washington Rubber Group, Cosmos Club, Washington, D. C.

Feb. 2. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Feb. 16. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Feb. 23. Quebec Rubber & Plastics Group, Ladies Night, Community Hall, Town of Mount Royal, Que., Canada.

Feb. 28-Mar. 1, 2. Rubber Division, A.C.S., Spring Meeting, Shoreham Hotel, Washington, D. C.

Mar. 5-9. A.S.T.M., Spring Meeting, Netherland Plaza Hotel, Cincinnati, Ohio.

Mar. 9. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Mar. 15. Quebec Rubber & Plastics Group, Queen's Hotel, Montreal, Que., Canada.

Mar. 16. Boston Rubber Group, Somerset Hotel, Boston, Mass.

Mar. 27. Washington Rubber Group, Cosmos Club, Washington, D. C.

Apr. 6. Akron Rubber Group., Hotel Mayflower, Akron, Ohio.

Apr. 10. Chicago Rubber Group, Morrison Hotel, Chicago, Ill.

Apr. 19. Quebec Rubber & Plastics Group, Queen's Hotel, Montreal, Que., Canada. (Joint meeting with SPI and SPE).

Apr. 24. Washington Rubber Group, Cosmos Club, Washington, D. C.

Apr. 26. Rhode Island Rubber Club, Metacomet Golf Club, East Providence, R. I.

Apr. 27. Detroit Rubber & Plastics Group, Spring Meeting, Detroit-Leland Hotel, Detroit, Mich.

May 22. Washington Rubber Group, Cosmos Club, Washington, D. C.

May 24-25. S.P.I., Annual National Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 15. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 15. Boston Rubber Group, Summer Outing. (Tentative).

June 18-22. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 22. Detroit Rubber & Plastics Group, Summer Outing.

Sept. 3-7. American Chemical Society, 75th Anniversary Jubilee Meeting, New York.

Sept. 5-7. Rubber Division, A.C.S., Commodore Hotel, New York, N. Y.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Detroit-Leland Hotel, Detroit, Mich.

Oct. 19. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 19. Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

Oct. 23. Washington Rubber Group, Annual Banquet, Cosmos Club, Washington, D. C.

Dec. 14. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.

Dec. 14. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston, Mass.

Baker Names New Sales Agents

Baker Castor Oil Co., New York 5, N. Y., has announced the appointment of two new sales agents. W. Ronald Benson, Inc., 558 First Avenue South, Seattle 4, Wash., has been appointed sales agent for the state of Washington. Benson maintains warehousing facilities at the Security Transfer and Storage Co. at the same address. Western Chemicals, Inc., Foot of S. W. Gibbs St., Portland 1, Ore., has been named sales agent for the state of Oregon. Western Chemicals also maintains warehousing facilities at the address in Portland.

YEAR-END STATEMENTS BY INDUSTRY HEADS REFLECT CONCERN FOR FUTURE

Concern over future defense needs was expressed by many industry leaders in their annual year-end statements. Harry E. Humphreys, Jr., president of the U. S. Rubber Co., stated, however, that the rubber industry is well prepared to meet the defense needs of the nation in 1951, and at the same time to keep the civilian economy rolling along in good shape. The industry has production facilities to turn out 120,000 tons of finished products each month, an increase of 40% over 1941, he said.

Actually, Mr. Humphrey said, no rubber shortage is foreseen for 1951 as a whole, unless rubber imports from Asia should be cut off or the Government should fail to expand its production of synthetic rubber as planned. But there will be a shortage for civilian products in the first quarter because in this period synthetic production unfortunately will not take up the slack caused by the drastic limitation in the use of natural rubber.

In the event of a general war, the rubber industry can convert more quickly than most industries to all-out defense production because the Armed Forces use many of the same rubber products that civilians use. This is particularly true of tires, which account for the major part of production.

Lower Consumption in 1951

John L. Collyer, president of the B. F. Goodrich Co., in his annual statement said that after weighing all factors, including the possibility of a major war, 1951 rubber consumption might range anywhere from 1,000,000 to 1,200,000 tons. At any rate, he pointed out, consumption in 1951 should be slightly lower than in 1950, when 1,240,000 long tons were consumed, despite higher military requirements.

The American rubber industry produced more than 77,000,000 passenger car tires in 1950, an increase of 12,000,000 units over 1949, Mr. Collyer said. Approximately 2,000,000 more replacement truck and bus tires were sold in 1950 than in the preceding year, he said, largely as the result of "scare buying" during the third quarter.

Although fewer tires will be sold to motorists and new car manufacturers in 1951, he pointed out, increased military requirements are expected to partially offset this reduction. In the year just ended only 2% of the rubber industry's production went to the Armed Forces.

Predicts Capacity Operation

J. P. Seiberling, president of the Seiberling Rubber Co., stated in his analysis of the prospects for 1951, that whether or not total war comes, the rubber industry will operate at full capacity during the year. Military needs, which are now taking only a small percentage of the industry output, will continue to grow.

Mr. Seiberling stated that the rubber industry's total output of civilian tires will be slightly lower than in 1950, principally because of Government controls on the use of materials. No one can accurately forecast how large military production will be, he stated, but it is certain that, regardless of war, it will more than take up the slack in civilian output.

The Seiberling president said that he expects original civilian passenger tire production to be down about 15% from 1950 and replacement down 10-12%, or about 16-18% overall. Farm tractor and implement tires will also be down about 15% from 1950, he said. Civilian demand for truck tires will be at least as great as it was in 1950, and possibly higher. The industry's ability to satisfy this demand will be limited only by the supply of materials available for production.

Firestone Pledges Defense Support

In his year-end statement, Harvey S. Firestone, Jr., chairman of the Firestone Tire & Rubber Co., pledged the company's support and all its facilities in aiding the country to accomplish the vital task of defense. Mr. Firestone noted that in the latter part of 1950, industry's sales far out-stripped its capacity to produce. He pointed out that the automobile and truck industries are just completing their greatest year with total vehicle production of about 8,000,000. The tire industry's banner year has resulted from supplying these new vehicles with tires and at the same time that replacement demand rose to very high levels.

The industry's production outlook for next year depends upon available supplies of rubber far more than on the usual factors of customer demand and buying power, Mr. Firestone said. "It is still too early to tell how much natural and synthetic rubber will be available but we are hopeful that when all synthetic rubber plants are operating at capacity, supplies of synthetic rubber will be relatively plentiful. Increasing orders for military tires and other defense products should keep the rubber industry going at a very high rate in 1951."

Mr. Firestone again urged the reactivation of the synthetic rubber plants in West Germany, stating that it is particularly unfortunate that the German synthetic rubber plant in the Russian Zone has been operating at full capacity since the end of the war while the synthetic plants in the Western Zones are still idle.

O'Neil Sees No Tire Shortage

William O'Neil, president of the General Tire & Rubber Co., is convinced that, even with a big increased demand for military purposes, there will be tires enough in 1951 to meet the vital domestic transportation needs, if the motorists buy only those tires absolutely necessary. Mr. O'Neil warned that a shortage can easily be created by a sudden hysteria wave. Industry can adequately handle normal demand in 1951, he said.

If the industry operates normally in the new year, Mr. O'Neil sees little likelihood of rationing. A heavy and sudden military "call up" could change the entire production picture. With one of its biggest sales years in history behind it, General Tire anticipates an equally big year in 1951. Mr. O'Neil said that the facilities and the personnel of the company are ready for any assignment.

Other Predictions for 1951

A shortage of polyvinyl chloride resins will continue throughout 1951 even though vinyl resin manufacturers have produced 50% more in 1950 than in 1949, George A. Fowles, manager of plastic materials of the B. F. Goodrich Chemical Co., stated recently before the Plastics Film, Sheeting and Coated Fabrics Conference of the Society of the Plastics Industry in New York City.

The vinyl industry will produce and use almost 300,000,000 pounds of resin by the end of the year, and will substantially expand its facilities in 1951, and there will still be insufficient resin to meet demand because of continued shortages of basic raw materials, notably chlorine, Mr. Fowles said.

At the end of 1951, vinyl resin plant capacity will be over 425,000,000 pounds, he said. However, it is extremely doubtful as to how much of the new capacity can actually be utilized unless an all-out emergency ensues with resulting allocation of basic chemicals to polyvinyl chloride manufacture, he added.

George C. Miller and C. W. Blount, vice-presidents and general sales managers, respectively, of the Thermoplastics and Thermosetting Departments of the Bakelite Division of Union Carbide and Carbon Corp., stated that both polyethylene and styrene are expected to be in particularly short supply during 1951.

Although a great many new uses were developed for polyethylene during 1950, it appears likely that many of them must be deferred because of the increasing military demand for this material. Styrene is being used in progressively greater amounts for the production of synthetic rubber. The demand for Vinylite resins in 1951 is expected to be even greater than in 1950, the Bakelite officials said.

The demand for plasticized film and sheeting is also expected to be greater in 1951 than in 1950. Mr. Miller stated that the plastic industry's production of vinyl resins for 1951 is expected to be in excess of 400,000,000 pounds if raw materials can be obtained for this rate.

Reduces Zinc Oxide Shipments

New Jersey Zinc Sales Co., New York 7, N. Y., has notified its customers that as of January 1, 1951, the company will be forced to reduce its shipments of metal oxide by 20%. The cut in shipments was attributed to the recent order by the National Production Authority which limits the amount of slab zinc which may be used in the production of French Process zinc oxide. The following "Horse Head" grades of zinc oxide are affected: XX-78; XX-592, all Kadox grades; White Seal-7; Green Seal-8; Red Seal-9; USP-12, and 512. The company stated that the NPA regulation provides that the above grades of zinc oxide covered by "DO" orders can be obtained in addition to the 80% mentioned above. The company will endeavor to fill these orders to the best of its ability.

STANDARD'S PARACRIL FACILITIES ACQUIRED BY U. S. RUBBER CO.

Purchase of the Paracril synthetic rubber plant of the Esso Standard Oil Co. in Baton Rouge, La., was announced on December 29 by the United States Rubber Co. The purchase was hailed by the company as a major step in the expansion of its facilities for the manufacture of chemicals, plastics and synthetic rubbers. The purchase price was not disclosed. The plant will be operated by the Naugatuck Chemical Division of the company which will continue to market Paracril. Sales will be handled by the division at Naugatuck, Conn.

According to John P. Coe, vice-president and general manager of the Naugatuck Chemical Division, there are three principal reasons why U. S. Rubber purchased the plant. These are:

First, it provides a healthy, growing business in Buna-N synthetic rubber which is in demand for the production of self-sealing fuel cells for military aircraft, oil-resistant rubber hose, belts and other industrial products, and as a plasticizer for many of the newer type plastics.

Second, it increases U. S. Rubber's facilities to produce high styrene copolymer latex in demand by the paint industry as a base for the newer types of water paints, by the paper industry as a partial replacement for casein in coating paper, and by the textile industry for various specialty applications.

Third, it provides additional production facilities to meet the sharply increasing demand by the plastics industry for the company's new plastic-rubber blends.

Present Plant Capacity

The plant now has the capacity to produce approximately 15,000,000 pounds of Buna-N synthetic rubber and high styrene latex annually. U. S. Rubber plans to expand production facilities so that the plant will manufacture more than 30,000,000 pounds of Buna-N synthetic rubber, high styrene latex and the new rubber-plastic blends annually.

Completed in 1941, the plant is situated on a tract of land adjoining the Esso Standard Oil Refinery at Baton Rouge. It is one of the most modern of its type and has good rail, highway and water transportation facilities. The first batch of GR-S all-purpose synthetic rubber produced in the United States was made at this plant in December, 1941, under a co-operative program by technicians of Esso Standard Oil and U. S. Rubber.

This is the second major expansion announced by Naugatuck Chemical during the past year. On December 31, 1949, it acquired the Painesville, Ohio, vinyl resin plant of Glenn L. Martin Co. together with the trade name Marvinol and laboratory facilities in Baltimore, Md. This marked Naugatuck Chemical's entry into the vinyl plastics field as a primary producer.

According to Cecil Morgan, vice-president of the Esso Standard Oil Co., all Esso employees in the Paracril plant at Baton Rouge will be provided with suitable assignments elsewhere in the refinery. Mr. Morgan made it clear that continued operation by Esso for the government of the plants producing butyl rubber is not affected by the sale of the Paracril facilities.

Until the sale of the facilities to U. S. Rubber, the marketing of Paracril was the responsibility of the Enjay Co., Inc., a wholly-owned subsidiary of Esso Standard Oil Co. The Enjay Co. remains as an entity and will continue marketing Vistanex, a polymer of isobutylene which finds wide application in the insulated wire and other fields, as well as all of the oil additives and petroleum derivatives which it has been selling in the past.

Status of Personnel

John A. "Jack" Britton, Jr., continues as president of the Enjay Co., while Irving Lightbown, who was sales manager of the Rubber, Plastics and Chemical Division, will remain with the company on a new assignment. Both Hector Evans and W. H. Peterson, technical sales representatives operating out of the New York and Chicago offices, respectively, also will stay with the company on new assignments. The status of E. N. Cunningham, R. H. Dudley and W. A. Fairclough, all former technical sales representatives on Paracril, is not definite at this writing, although all of them have been invited to remain with the Esso organization.

Named Sharples Mobilization Head

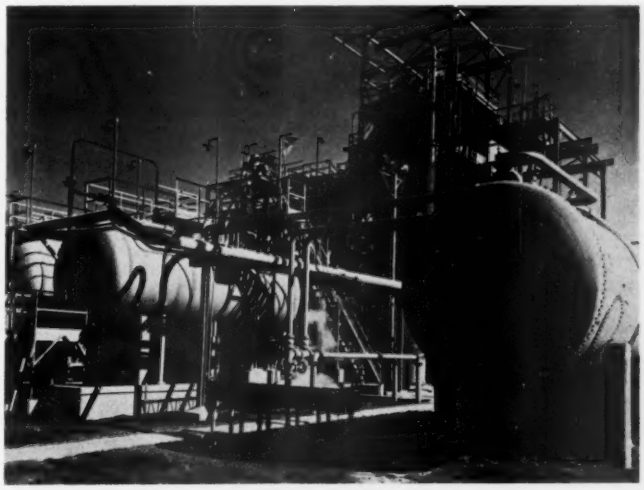
N. J. Hooper, vice-president and a director of Sharples Chemicals Inc., Philadelphia 9, Penna., has been placed in charge of the company's mobilization planning in addition to his other duties. At the same time it was announced that George R. Lawson has been appointed general sales manager of the company.

Neoprene-Coated Radomes

One of the serious problems facing jet planes in flight is the attack of rain on the radome. Radomes are of plastic laminate construction, layers of fabric bonded together with a heat-hardening resin. They house the plane's radar equipment and cannot be made of metal because metal blocks the radar signal. The Air Force is sponsoring extensive research to improve the durability of the laminate and to find a suitable protective coating. Although final tests are still being made, the solution seems to be in sight. A thin coating of neoprene has been found to furnish remarkable protection, according to DuPont engineers. A coating of only 10 to 12 thousandths of an inch thick prevented damage to laminates for 10 hours in test flights through rain at 400 m.p.h. In addition to being tough, the neoprene coatings are easy to apply. In addition, when the coating wears down a little it can be built up again by spraying on more neoprene.

Barrett Sets $4,500,000 Project

Barrett Division of the Allied Chemical & Dye Corp., New York, N. Y., has announced a $4,500,000 expansion project in Chicago, Ill. The major purpose of this project is to substantially increase the company's capacity for the production of phthalic anhydride, now being manufactured at its Philadelphia, Penna., and Ironton, Ohio, plants. Also included in the project are added refining facilities and an entirely new power plant. The Chicago location for the new phthalic anhydride facilities, which will be in volume production by the end of 1951, will permit the company to meet increasing demand for the chemical in the Chicago-Detroit area.



Shown above is a view of the Buna-N synthetic rubber plant at Baton Rouge, La., which the U. S. Rubber Co. has purchased from the Esso Standard Oil Co. Storage tanks are seen in the foreground while the reactor area is in the background.

RMA YEAR-END STATEMENT CITES PRODUCTION AND CONSUMPTION RECORDS

In its review of rubber manufacturing activities during 1950, the Rubber Manufacturers Association called attention to the all-time production and consumption records which were set in 1950 despite the most difficult supply and cost problems. Every branch of the industry reported a higher level of activity as reflected by the increase in rubber consumption to a record of 1,240,000 long tons, up 25 percent from 1949, and 10 percent above 1947, the previous peak. The industry consumed 711,000 long tons of natural rubber and 529,000 long tons of synthetic rubber.

Passenger car tire production reached a new peak at 79,000,000 units, as compared with 65,000,000 in 1949 and 78,000,000 in 1947, the previous high. Truck and bus tire production was estimated at 14,150,000 units as compared with 11,230,000 units in 1949 and 17,750,000 units in 1947, the earlier peak.

Natural rubber cost had moved within a narrow range since 1940, but in the early spring of 1950 world demand and speculation of a violent nature increased costs to a high of 91 cents a pound by mid-autumn. By mid-December natural rubber costs ranged from 60 to 75 cents a pound. The cost of this raw material remains a real problem when it is considered that a rise of only one cent adds 13½ million dollars to the nation's rubber bill on the basis of consumption at the rate of 600,000 long tons a year, the Association pointed out.

High Consumption Requirements

Two principal factors in the supply picture were the unbelievably high consumption requirements in natural rubber both, in this country and throughout the world coupled with the impact of the governments accelerated purchases for the security stockpile. The sole helpful influence was the increasing production of American-made synthetic rubber, though it must be noted that at no time in the past seven months was the government able to meet all demands for either general purpose synthetic or butyl rubber. Of the 529,000 tons of synthetic consumed in the past year, use was distributed as follows: general purpose, 408,000 long tons; butyl, 65,000 long tons; neoprene, 42,000 long tons, and N-types, 14,000 long tons.

Where synthetic rubber consumption was down to 33,966 long tons in January, it had soared to 52,000 tons a month in December. Its use will go higher in 1951 as more synthetic plants come into operation by reason of security limitations imposed by the government on natural rubber consumption to speed up stockpile accumulation of this critical raw material.

Facing up to the acute natural rubber supply problem and increasingly formidable political developments in Far Eastern rubber producing countries, the rubber manufacturing industry moved in April to encourage the government to increase synthetic rubber production in the United States. These recommendations were placed before the Reconstruction Finance Corp., the Senate Armed Services Committee, the NSRB and the Munitions Board between April and July 6. By September the government had moved to reactivate all of the standby synthetic rubber and feedstock plants. Full impact of the new synthetic production will not be felt until early 1951.

The plainly apparent need for more synthetic rubber also foreshadowed the growing need, after outbreak of the Korean war, for measures to conserve scarce natural rubber. Thus the rubber industry—the only industry in America never fully decontrolled since World War II—became on September 1 the first to feel the tightening of federal restrictions in a new period of national emergency.

Controls both on the use of all new rubber and on the consumption of natural rubber have been increased progressively since that time. But while the permitted February, 1951, use of natural rubber has been slashed to 43 percent of the industry's adjusted base period, total allowable consumption in January and February will permit the continuance of rubber goods production at approximately the same volume attained in the base period year ended June 30, 1950.

Settlement of two issues in the field of collective bargaining stood out in 1950, a year singularly free of strikes and major work stoppages in this industry. In September and October, the large companies negotiated wage increases which averaged about 12 cents an hour on a company wide basis. This brought the average hourly earnings of workers in the tire and tube industry, as an example, to a point where they are among the highest paid in all manufacturing industries in the United States. Average hourly earnings in the tire and tube industry were reported by the Bureau of Labor Statistics at $1.84 prior to the increase. The adjustment increases these earnings by at least 12 cents an hour, exclusive of overtime. Pension plans negotiated late in 1949 and in early 1950 also were a factor in increased production costs.

Mechanical Goods Production

Apart from tires and tubes, the second largest segment of the rubber manufacturing industry is the rubber mechanical goods division. Its production covers more than 30,000 end products, including such items as V-belts, hose, conveyor belts, foam rubber products, engine mountings, tubing, molded and extruded goods, insulating materials, mats, hard rubber products, gaskets and packing, and many others.

Generally speaking, the increases for the industry from 1949 to 1950 were 40 percent. In cut-thread, a low tonnage item, but important in its widespread use in women's garments, all types of elastic webbing, and elastic for various wearing apparel, production was up 100 percent from 1949.

In the field of latex foam—a pre-war baby but a post-war giant—business reflected the boom year demand. Dollar volume was up 100 percent from 1949. In mid-December, back orders unrolled for months ahead, reflecting the tremendous public acceptance accorded this revolutionary cushioning material.

Rubber footwear, following two mild winters in the areas of heaviest population, had its second successive decline in waterproof footwear, but the industry recorded a compensating increase in the production of rubber-soled canvas shoes. Rubber flooring production jumped 15 percent in 1950, from 81,600,000 square feet in the previous year to 93,800,000 square feet.

The coated materials division of the industry will show an increase of approximately 10 percent in linear yard production over 1949. This production includes coated and combined fabrics using natural and synthetic rubber compounds as the coating media. Principal end uses include fabrics employed in fitting land, sea and air transportation equipment, furniture, rainwear and industrial protective garments, bed and crib sheeting for homes and hospitals, shoe and novelty fabrics, unsupported film and coated fabrics for the government. Expectations are that the industry will be called upon to furnish large volume yardage for military requirements in 1951. In both rubber sundries and rubber heels and soles there were substantial gains in production over the previous year.

Offers Plasticizer Data Sheets

The release of technical data sheets describing Pittsburgh PX phthalate plasticizers has been announced by the Plasticizer Division of the Pittsburgh Coke & Chemical Co., Pittsburgh 19, Penna. The data sheets cover three phthalate ester plasticizers of special interest to the rubber, vinyl resin and protective coatings industries—PX-104, dibutyl phthalate; PX-108, diisooctyl phthalate, and PX-138, dioctyl phthalate. The data sheet on each of these products includes a table of properties of the pure compound, a description of the product's uses, and an indication of the compatability of each plasticizer with various natural and synthetic resins. In addition, the information includes sales specifications and full commercial information regarding containers, shipping points, and drum color code. Copies of the data sheets may be obtained from the company.

Goodrich Marks 80th Anniversary

December 31, 1950, marked the 80th year since the founding of the B. F. Goodrich Co. in Akron, Ohio, by the late Dr. Benjamin Franklin Goodrich. Established with less than $20,000, the company has grown to one of the largest rubber manufacturing firms in the world. The company points to a long line of research and development contributions made during the past 80 years, and particularly its contributions toward the development of synthetic rubber. In December, 1945, on observance of the company's 75th anniversary, ground was broken at Brecksville, Ohio, for the construction of a modern research center. This new facility was opened in 1948, and is regarded as one of the most complete workshops of science now in existence.

Spencer Named NPA Rubber Director

Leland E. Spencer, vice-president of the Kelly-Springfield Tire Co., a subsidiary of the Goodyear Tire & Rubber Co., has been appointed director of the Rubber Division of the National Production Authority. Mr. Spencer, who took office on January 8, has been given full authority over NPA's rubber operations, which include the administration of allocation and priority controls over all types of rubber. Earl W. Glen, who has been acting as head of the division, has been named deputy director.

Mr. Spencer was born in Merritt, N. C., in 1908, and joined Goodyear in 1926. In 1939 he was made manager of merchandise planning for Goodyear, and in 1942 was granted a leave of absence to serve in the Rubber Director's office in Washington, D. C., where he was in charge of allocation of materials and government orders of all tires.

In 1947 he was again given a leave of absence to serve under Gen. Lucius Clay in Berlin, as administrator of internal and export commerce and industry for the American and British zones. In 1949 he returned to the United States and was made vice-president of the Kelly-Springfield Tire Company.

Mr. Glen was born in Central Falls, R. I. He was graduated from the Massachusetts Institute of Technology and before entering the Government service had wide experience in design and development engineering with the Goodyear Tire & Rubber Company.

He joined the Rubber Division of the Civilian Production Administration in December, 1945, as assistant director in charge of technical operations. Later he became chief of the Rubber Division in the Commerce Department's Office of Materials Distribution, and subsequently its Office of Industry and Commerce.

FTC Monopoly Charges Denied

Five Standard Oil Companies and the Atlas Supply Co. filed their answers on December 13 to charges by the Federal Trade Commission that they indulged in monopolistic practices. The FTC described the answers as denying "virtually every material allegation of the complaint." The FTC complaint, issued on July 25, alleged that the concerns engaged in a "conspiracy in restraint of trade and unlawful receipt of brokerage fees and price discriminations." Specifically involved were the purchase and resale of tires, batteries and other automobile accessories. The companies listed were the Atlas Co. of Newark, N. J., the Standard Oil Co. (Ohio), Standard Oil Co. (Kentucky), Standard Oil Co. of California, Standard Oil Co. (Indiana), and the Standard Oil Co. (N. J.).

Freeze-Resistant Rubber Band

B. F. Goodrich Co., Akron, Ohio, has announced a new, white, freeze-resistant rubber band designed to hold glassine or wax paper protective covers to food containers during the freezing process. The new bond is made of a special rubber which keeps its snap at sub-zero temperatures.

Leland E. Spencer

Recently appointed director of the Rubber Division of the National Production Authority.

FCC Approves Lee Radio Sale

The Federal Communications Commission on December 27 authorized the sale of the Don Lee broadcasting properties in California to the Retirement Fund for Salaried Employees of the General Tire & Rubber Co. for $12,320,000. The fund will immediately sell the four standard stations, one television station, one FM station and ten experimental and relay stations to others, retaining the Don Lee real estate as an investment. Radio stations KHJ and KHJ-FM at Los Angeles, KFRC at San Francisco, and KGB at San Diego, will be sold to the General Tire & Rubber Co., which now owns the Yankee Network in New England. The price is to be $650,000, subject to adjustments at time of sale. The company will also rent certain real estate from the pension fund for ten years at a price of $3,480,000.

Goodrich Votes Stock Split

Stockholders of the B. F. Goodrich Co. at a special meeting in New York City on January 3 approved the directors' proposal to split the common stock three for one. The company fixed the close of business on January 10 as the record date for determining the stockholders entitled to receive the additional shares resulting from the split. Certificates for additional shares will be mailed to such stockholders about January 19. The issued shares of common stock will be increased to 4,107,702 and the authorized common stock will consist of 6,885,622 shares. The action will not affect any change in the capital or surplus account of the company.

Cooperation requested! Please return your completed 1951 RUBBER RED BOOK questionnaires as quickly as possible.

Goodyear To Continue Expansion

In spite of governmental regulations on the use of rubber, the Goodyear Tire & Rubber Company plans no changes in its current expansion program on foamed latex production facilities. R. E. Pauley, manager of the company's Airfoam Division, said the production of Airfoam will be continued by his company in such quantities as are permitted by governmental regulations and supply of materials, both natural and synthetic. Barring further cutbacks on use, he said, Goodyear should be able to take care of reasonable requirements of furniture manufacturers. He advised, however, that the future international situation and the nation's efforts to build up a stockpile of liquid and dry rubber, could make any forecast mean little or nothing almost overnight. Prior to the start of the Korean hostilities Goodyear instituted a large expansion program to handle increased demands of both furniture and automotive manufacturers. These units are being completed in anticipation of normal business operations, Mr. Pauley said. The very fact that Goodyear has spent several million dollars in expanding its Airfoam facilities, he continued, is evidence of the company's desire to meet the increasing requirements of these and other industries.

ACS Proposes Mobilization Plan

Total mobilization of the nation's scientific and technical manpower between the ages of 18 and 65, in the event of an all-out war effort, has been recommended by the American Chemical Society in a report to the National Security Resources Board made public on December 28. The ACS plan, which would transfer control over scientific manpower from Selective Service to a new civilian board, would become effective only in a situation so grave as to compel adoption of a national service act, at least for technical personnel, under the provisions of the report. For the present, the report says, optimum utilization of scientific and engineering skills within the terms of existing legislation should be sought through a modification in procedure suggested to Major General Lewis B. Hershey, Director of Selective Service, by his own scientific advisory committees. The central proposal of these committees is that superior university students be deferred from military service indefinitely to continue their studies, and even longer if their training and capabilities are needed elsewhere in the defense program.

Dillon Moves Plant and Offices

W. C. Dillon & Co., Inc., has moved its plant and offices from Chicago, Ill., to 1421 South Circle Avenue, Forest Park, Ill., a suburb of Chicago. Approximately 15,000 square feet of floor space is available at the new facilities. This is being equipped with specialized machines and calibrating equipment, and what is probably the most complete dead weight testing set-up in the middle west. A new Electronic Department is presently engaged in communications and carrier research. Dillon manufactures testing equipment, gauges, switches, etc.

SECOND SPI CONFERENCE HELD ON PLASTICS FILM AND SHEETING

A number of interesting papers were delivered at the Second Conference of the Plastics Film, Sheeting and Coated Fabrics Division of the Society of the Plastics industry, Inc., held at the Commodore Hotel in New York City on December 14 and 15. Arthur M. Ross of Ross & Roberts, Inc., and H. R. Thies of the Goodyear Tire & Rubber Co., presided at the sessions on December 14. George S. Laff of the Bolta Co. and Fred S. Strauss of Harte & Co., Inc., presided at the December 15 sessions.

On December 15, a panel discussion was held on the material supply situation. Participants included H. J. Ratti of the National Lead Co. who spoke on stabilizing agents and S. L. Karples of the Imperial Paper and Color Corp. who spoke on pigments. George A. Fowles of the B. F. Goodrich Chemical Co. addressed the meeting on the subject of resins, and D. A. Comes of the Farrel-Birmingham Co. spoke on mechanical equipment. W. A. Woodcock of the Carbide & Carbon Chemicals Division of the Union Carbide & Carbon Corp. spoke on the subject of plasticizers.

Mr. Comes, in speaking on "The Availability of Mechanical Equipment," stated that his company is supplying and can continue to supply Banbury mixers, plastic mills, plastic calenders, both of the Z and inverted L type, and screw machines for the plastic industry. The speaker asserted, however, that certain materials used in the manufacture of this machinery may have to be replaced by other types. The material in the planned substitutions, he said, is almost as good as the material that is being replaced.

Pigment Industry Prepared

"Pigment Material Supply Situation" was the title of the paper delivered by Mr. Karples. The speaker noted that plastic films, sheeting and coated fabrics utilize practically all types of pigments and all types of pigments utilize the basic chemicals and metals which will be used in any rearmament program. The pigment industry has expanded considerably since World War II, he said, and if raw materials are not too closely curtailed, the industry should be able to take care of military requirements plus most civilian needs.

Discussing "Vinyl Stabilizer Supplies for 1951," Mr. Ratti said that a poll of the vinyl stabilizer manufacturers shows that, with some minor exceptions, there will be an adequate supply of stabilizers for 1951 and the predictable future. The industry is modest in size, representing during 1950 an annual volume of approximately 5,000 tons. Some twenty to twenty-five chemicals are used in the manufacture of stabilizers, Mr. Ratti asserted. Although a number of strategic materials are included in these products, among them lead, tin, and cadmium, none of the materials are used in sufficient quantity to create any severe supply problems.

"Surface Coatings and Free Films From Organosols and Plastisols," by George E. Stevenson of the Weymouth Art Leather Co., was another paper presented at the SPI conference. Mr. Stevenson explained that organosols and plastisols are not products, they are processes by which a continuous film of resin is produced either as a film or applied to a supporting fabric or other medium. The plastisol process is a form of the organsol process differing in that very little or no volatile liquids are used. For practical purposes, Mr. Stevenson said, "we call the process plastisol if less than 5% of the volatile liquids are used, organosol if the amount is greater."

Fred G. Clark of the Bakelite Division of the Union Carbide & Carbon Corp. contributed a paper on "Color Problems in Vinyl Film and Sheeting." Mr. Clark observed that just a little more than 10 years ago colored plastics items were limited to rigid molded articles, largely phenolics, ureas, and cellulose acetate. Polystyrene and the rigid vinyls were just taking hold. Since then a whole new industry based on the vinyl chloride polymers and copolymers has grown up. Much of the rapidity of this growth is due to dioctyl phthalate, generally known as DOP. In 1940, DOP was a laboratory product. When DOP became a commercial product, the first really good vinyl films and sheeting became available, he said.

Temperature and Pressure Factors

"Accurate Temperature Control for Calenders and Presses," was another subject considered at the conference. Paul L. Geiringer, chief engineer of the Hydrotherm Corp., in delivering the paper stated that the shaping of an amorphous mass into a sheet is one of the most important processes of the plastics industry. Pressure and temperature are, therefore, the determining factors for molding the material. Both have to be carefully coordinated to the properties of the plastics.

The chemical structure of the plastic material determines its physical properties and raises or lowers the zone of plasticity, where the exercising of a certain pressure permits molding the material and obtaining coherent sheets of the required thickness. In order to produce uniform and coherent plastic surfaces of equal structure, it is necessary to heat the plastic most uniformly as the pressure is applied uniformly on the entire surface of the material.

Rolland L. Jenkins of the Canadian Radium and Uranium Corp. delivered another of the interesting papers before the conference entitled "Radio-Active Static Eliminators for Improving Quality of Printed Vinyl Films and Eliminating Fire Hazards." Mr. Jenkins gave a brief description of the problem caused by static electricity when printing vinyl film and the solution. This consisted of the installation of radio-active static eliminator bars.

Other Papers Presented

Among other papers presented at the conference was one on "Vinyl Fabrics for Furniture Today and Tomorrow," by Walter S. Marder of the Daystrom Corp. Vergil D. Reed, associated with the J. Walter Thompson Co., spoke on "The Values of Marketing Research," while Hans S. Vohs of the Rochlen Engraving Works, Inc., gave "A Review of Vinyl Embossing." "Film and Sheeting Products at the Retail Level," was discussed by Ephraim Freedman of R. H. Macy & Co., Inc.

Adhesives Makers Meet with NPA

Representatives of the adhesives manufacturing industry met with officials of the National Production Authority on December 18 in Washington, D. C., to discuss the industry's role in the defense program. The group discussed problems of meeting both military and essential civilian needs. Industry representatives pointed out that "DO" defense rated orders placed with their industry are currently absorbing the available supply of polyvinyl alcohol. They said that sizeable amounts of polyvinyl alcohol are now being used by manufacturers of V-board for weatherproof containers. The industry recommended that V-board manufacturers convert to use of formaldehyde and starch adhesives, which were initially used in making V-board and which are in adequate supply at present. They said this would release the amount of polyvinal alcohol needed to meet essential civilian adhesive requirements. NPA told the industry members that it would take under advisement all the suggestions made.

Manhattan Rubber Appointments

R. J. Gorecki, associated with the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., since 1926, has been named factory manager of the division, succeeding the late Harry V. Snyder. At the same time, W. E. Perkins, also with the division since 1926, was named assistant factory manager. D. J. Fenelon, who began his career with Manhattan in 1916, has been named director of labor relations. The position of personnel manager has been assigned to R. Griffith, who has been with the company since 1916. J. Freeland, associated with the company since 1942, has been named manager of the Cord Belt Department, while A. P. Schneider, who joined Manhattan in 1944, has been appointed superintendent of the Cord Belt Department. Mr. Gorecki, the new factory manager, was chief consulting engineer of the North Jersey Division of the War Production Board during World War II.

Carborundum Merger Abandoned

Plans for the merger of the Carborundum Co. of Niagara Falls, N. Y., and the Minnesota Mining & Manufacturing Co., of St. Paul, Minn., have been abandoned according to a recent joint announcement by H. K. Clark and W. L. McKnight, presidents of the respective firms. They said the proposed merger was abandoned by mutual consent as a result of the Kefauver Anti-Merger Bill which would broaden the anti-trust laws and might raise a question as to the validity of the merger. The statement said stockholders of both companies are being formally notified of the action.

FOUR-POINT RUBBER PROGRAM URGED FOR FURTHER SECURITY

A letter expressing full confidence in his leadership and suggesting immediate positive action which should be taken to protect our national security in rubber was recently forwarded to C. E. Wilson, defense mobilization director, by John L. Collyer, president of the B. F. Goodrich Co.

In his letter, Mr. Collyer said "the steps taken earlier to restrict rubber consumption at home, to reactivate synthetic rubber production facilities, and to centralize crude rubber buying and imports in the hands of the government are all important and necessary. Alone, however, they will not do the job."

Further immediate direct action is required, he said, and recommended four steps that must be taken immediately in the interests of the defense program and the security of American citizens and friendly nations. They are:

1. The majority of the foreign countries presently consuming precious crude rubber to the limit of their product capacities are Atlantic Pact nations receiving military and financial aid from the United States. Our common defense preparation objectives could be furthered, and the crude rubber supply position alleviated, if our government would prevail upon those nations, and on Western Germany and Japan, to restrict the use of crude rubber for civilian purposes just as the United States has done.

2. Consumption restrictions in the United States and, when achieved, the other nations mentioned above, will make sufficient crude rubber available to us and our allies only if exports from the rubber-producing territories to Russia, her satellites and, particularly, the non-consuming areas of Asia, are drastically reduced or cut off. Therefore, our government should strongly urge an immediate prohibition of such shipments.

3. The favorable cost-reduction objective of the government move to take over all crude rubber buying and importing can be achieved or lost depending largely on the wisdom employed in the execution and administration of the program. The rubber industry, with its vast experience in the procurement of crude rubber, is anxious to make this experience and its manpower available to government for use in the prosecution of this buying program.

4. Our nation's immediate rubber supply problem for current military and essential civilian production can be solved only through the most rapid possible reactivation of American rubber-producing facilities. No time should be lost, and no effort spared, to insure early full-scale synthetic rubber output.

Mr. Collyer said in his letter that the control measures already in operation and reactivation of the American rubber-making plants have had little effect on the serious price conditions that have existed in world crude rubber markets since April of 1950. Increased demand for current consumption, consumer scare buying, and stepped up stockpiling purchases brought the price to 35 cents a pound on June 1, 1950, to 60 cents a pound in August, and to a high of over 90 cents a pound in November, he said. "Since then," he said, "the price has receded slightly but has fluctuated around the 70 cent a pound level, reflecting an increase of nearly 300 per cent over the January, 1950, level. This price behavior is symptomatic of the seriousness of the rubber problem that we continue to face today."

Mr. Collyer pointed out that world supplies of crude rubber in 1950 have attained an all time high, with output for the year now estimated at 1,850,000 long tons. "The share coming to the United States, however, has been disappointingly low," he said. The Goodrich executive said that before World War II and again in 1947 the United States received an average of 54 per cent of the total world supplies of crude rubber, but that the proportion received in 1949 and 1950, for both current consumption and strategic stockpiling, was only 44 per cent. He said this represented a loss to the United States of approximately 200,000 long tons of rubber.

Minnesota Stock Split Approved

Stockholders of the Minnesota Mining & Manufacturing Co. meeting in St. Paul, Minn., on January 5, overwhelmingly voted in favor of a four-for-one stock split of the common stock. Proxies received in advance of the meeting cast 1,620,640 votes for the split and only 100 against. The split proposal provides that stockholders of record on January 8, 1951, receive three additional shares of common stock for each share held. Stockholders also voted to increase the authorized number of outstanding common shares from 5,000,000 to 10,000,000. There were about 1,982,132 shares outstanding before the stock split, and 7,928,528 after the split.

Questionnaires for the 1951 RUBBER RED BOOK should be completed and returned as quickly as possible.

RUBBER HEEL & SOLE INSTITUTE HOLDS MEETING IN NEW YORK CITY

Members of the Rubber Heel and Sole Institute, meeting on January 5 at the Waldorf-Astoria Hotel in New York City, expressed confidence that their industry could meet any demands made on it due to mobilization. Dr. Robert A. Winters, director of the Institute, pointed out that with sole leather scarce during the last war the industry had been able to meet all demands. Since 1945, he said, the Department of Commerce index has shown that the percentage of shoes soled by the industry's products has risen from 18 or 20 per cent to a little more than 50 per cent.

The Institute is composed of makers of shoe bottoms alone and is not affiliated with the Rubber Manufacturers Association. Much of the discussion at the meeting, however, centered on proposed cooperation in the event of a crisis with the sole and heel division of the larger body which includes the big tire makers and manufacturers of other rubber products.

It was pointed out that the shoe bottom makers are not dependent on natural rubber. Dr. Winters said the industry was now the second largest user of synthetic rubber. Much of its utility in the field he attributed to the work of Massachusetts Institute of Technology carried on by the Elastic Colloid Research Corporation which the Rubber Heel and Sole Institute organized and supports along with a fellowship in research.

Officers of the Institute elected at the meeting included the following: *President*, W. P. Harty (Avon Sole); *Vice-President*, R. M. Hoffman (Victor Products); *Secretary-Treasurer*, M. J. Bernstein (Panther-Panco Rubber). Kyle Menuez (Gro-Cord Rubber), retiring president, was elected a director.

David Cutler (Alfred Hale Rubber) was elected president of the Elastic Colloid Research Corporation; David Bernstein (Panther-Panco Rubber), vice-president; Sol Schwaber (Monarch Rubber), secretary, and Mr. Menuez, treasurer.

Dr. Winters was re-elected director of the Institute and manager of the research corporation.

Scarce Material Hoarding Banned

The National Production Authority, on December 28, 1950, acted to prevent the excessive accumulation of a wide range of materials, including styrene, polystyrene, polyethylene and titanium pigments, important to both defense and civilian production. The new order, NPA Notice 1, falls under the anti-hoarding provisions of the Defense Production Act. The notice covers those materials, under the jurisdiction of the Department of Defense, vital to meeting defense production needs. Section 102 of the Defense Production Act specifies that hoarding of important materials may be either that which is (1) in excess of reasonable demands of business, personnel, or home consumption, or (2) for the purpose of resale at prices in excess of prevailing market prices of materials, the supply of which would be threatened by such accumulation.

NAMES IN THE NEWS

DR. C. J. MIGHTON, formerly technical manager of the Akron laboratories of the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., has been appointed assistant director of the Grasselli Chemicals Department's laboratories at the DuPont experimental station in Wilmington, Del.

MURRAY TRIBBETT, previously associated with the Hydraulic Press Manufacturing Co., has been appointed chief engineer of the Hydraulic Press Division of the French Oil Machinery Co., Piqua, Ohio.

DR. EDWIN R. GILLILAND, professor of chemical engineering at Massachusetts Institute of Technology, and Henry L. Gilbert, Jr., vice-president of the Dewey and Almy Chemical Co., have been elected to the board of directors of the company.

J. S. JOHNSON, associated with the U. S. Rubber Co. since 1931, has been appointed assistant to the president, succeeding G. R. MCNEAR, who has been elected a director and managing director of the North British Rubber Co., Ltd., Edinburgh, Scotland, in which U. S. Rubber is a substantial stockholder.

DR. G. G. OBERFELL, who during World War II directed construction and operation of the Government-owned synthetic rubber plant at Borger, Tex., has been appointed a synthetic rubber consultant to the Reconstruction Finance Corp.

ROSS EVANS, formerly associated with the National Oil Products Co., has joined the staff of Julius Schmid, Inc., Little Falls, N. J.

VAN C. CARR, auditor and assistant secretary of the Adamson-United Co. at Akron, Ohio, has been transferred to the Youngstown, Ohio, plant of the parent company, United Engineering and Foundry Co. MR. CARR has been succeeded at Akron by MARK M. WOLF, of United Engineering's New Castle, Penna., offices.

A. L. THURMAN, assistant to the vice-president of the Aetna-Standard Engineering Co., Youngstown, Ohio, has been elected president of the Mahoning Valley Society of Professional Engineers, a chapter of the National Society of Professional Engineers.

J. CALVIN LEE, associated with the Columbia Chemical Division of the Pittsburgh Plate Glass Co. since 1937, has been appointed district sales manager at Cincinnati, Ohio, succeeding MARTIN LOW, who has retired.

PENDENNIS W. REED, president of the Pequanoc Rubber Co., Butler, N. J., and the Bishop Manufacturing Co., Cedar Grove, N. J., has been elected a member of the newly-formed Young President's Organization.

ELIAS M. SALZBERG, prominent Akron rubber broker, is currently undergoing surgery and treatments at Johns Hopkins Hospital at Baltimore, Md., to escape the threat of blindness. Despite his affliction, he is continuing to serve his customers as he has for the past 43 years.

ROBERT C. STELL, manager of the Archer Ave. synthetic rubber plant in Akron operated by the Goodyear Synthetic Rubber Corp., has been elected chairman of the Akron Section of the American Institute of Chemical Engineers for 1951.

RAYMOND J. CONSLEY, who has been serving as counsel to the Office of Rubber Reserve since 1941, has ended a 15-year association with the Reconstruction Finance Corporation and is currently conducting a private law practice in Washington. He already represents several rubber companies.

EDWARD C. HEMES, who has been associated with the sales department of Vulcan Rubber Products, Inc., of Brooklyn, N. Y., formerly known as the Vulcan Rubber Proofing Co., since 1946, was recently named general manager of the company.

J. B. BARRETT, secretary-treasurer of the Pyramid Rubber Co., Ravenna, Ohio, was recently elected to the board of directors of the First National Bank of Akron.

MARK M. BIDDISON, vice-president of the General Chemical Division of the Allied Chemical and Dye Corp. since 1947, and associated with the company for some 33 years, has been elected executive vice-president.

PAUL S. GREER, assistant manager of research and development of the Office of Rubber Reserve for the past four years, was recently appointed manager, succeeding OLIVER BURKE, JR., who resigned to establish a consulting laboratory in Detroit.

ALFRED CUTLER, who has been associated with the International B. F. Goodrich Co. for the last 13 years, has been named assistant manager of the Seiberling Rubber Export Co. at Akron.

H. E. SHAWVER, a veteran of 27 years in the construction field, has been named manager of construction industry sales for Hewitt-Robins, Inc. He will maintain an office for sales of rubber and conveyor division products in Dallas, Texas, and will be responsible for sales to the construction industry in all parts of the country.

ALBERT M. FIALA, manager of latex foam product sales for the B. F. Goodrich Co. for the past 10 years, has been named manager of government sales in the Industrial Products Sales Department of the company.

F. WARREN BICKEL, previously technical director of the Diamond Wire & Cable Co., Sycamore, Ill., has been named project leader in the new rubber research laboratory recently established at the Armour Foundation of the Illinois Institute of Technology.

PATRICK J. FLYNN, associated with Whittaker, Clark & Daniels, Inc., New York, N. Y., since 1890, was recently honored with a testimonial dinner upon his completion of 60 years with the company.

MARK K. HOWLETT, associated with the Chemical Department of the General Electric Co. at Pittsfield, Mass., has been appointed silicone sales supervisor with headquarters at Waterford, New York.

PAUL WELLER, associated with the Wyandotte Chemicals Corp., Wyandotte, Mich., since 1945, has been appointed district manager of the Cincinnati, Ohio, office of the Michigan Alkali Division of the company.

JOHN M. COOK, previously associated with the Colonial Provision Co., Boston, Mass., has joined the Cryovac Division of the Dewey & Almy Chemical Co. in Cambridge, Mass., to do development and sales service work with particular emphasis on frozen foods.

FRANK W. TELFORD, for many years manager of the Detroit, Mich., manufacturers' sales office of the Goodyear Tire & Rubber Co., was recently presented a 40-year service pin marking his four-decade association with the company.

LOUIS R. KLINCK, formerly with Canadian Resins and Chemicals, Ltd., at Shawinigan Falls, Quebec, has joined the development department of Naugatuck Chemicals at Elmira, Ontario. Mr. Klinck obtained his master's degree in chemical engineering from Queen's University in 1947.

ROBERT G. KENLY has been appointed general sales manager of the New Jersey Zinc Co. and the New Jersey Zinc Sales Co. succeeding RALPH M. NEUMANN who recently retired after 44 years with the company.

WILLIAM I. BURT, vice-president in charge of manufacturing for the B. F. Goodrich Chemical Co., has been elected vice-president of the American Institute of Chemical Engineers for 1951.

G. W. KUCKRO, associated with the General Electric Co. at Bridgeport, Conn., since October, 1949, has been named assistant section engineer in the Insulation Section of the Construction Materials Laboratory.

R. C. HARTZ, formerly purchasing agent of the Biggs Boiler Works Co., Akron, Ohio, has been appointed assistant general manager of the company. DAN F. STEWART, formerly associated with the Goodyear Aircraft Corp., has been appointed purchasing agent succeeding Mr. Hartz.

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Guayule Stockpiling Announced

The Munitions Board of the Department of Defense disclosed on January 3 that guayule rubber had been added to the nation's list of strategic materials to be stockpiled. According to John D. Small, who recently took over as chairman of the Munitions Board, money will be transferred from the Board to the Department of Agriculture. With this money, plus funds the Department of Agriculture is expected to seek from Congress, about 1,000,000 acres of guayule may be planted in California and some parts of Texas. This planting, according to rubber experts of the Department, eventually should yield at the rate of approximately 100,000 tons of end rubber products for each 200,000 acres.

In making the announcement, Mr. Small emphasized that recent experimentation on the part of the Department of Agriculture has cut to one-fifth the nursery costs of World War II work with guayule. Improved strains are said to yield as much as 70% more per plant. Also, the adaptability of the plant to dry, unirrigated sections of the Southwest is said to have been improved.

Goodyear Medalist Nominations

The Division of Rubber Chemistry, A.C.S., is currently considering nominations for a candidate to receive the Goodyear Medal in 1951. Nominations for this honor can be made by any member of the Division and such nominations should be sent to the secretary (C. R. Haynes, c/o Binney & Smith Co., 41 East 42nd St., New York 17, N. Y.) with a copy to the chairman of the Goodyear Medal Committee, Dr. F. W. Staveley, Firestone Tire & Rubber Co., Akron, Ohio. The Goodyear Medal is awarded to men who have contributed materially to the science of rubber chemistry and any nominations forwarded should include a list of achievements of the candidate. Nominations should reach the secretary and the chairman of the committee before February 15.

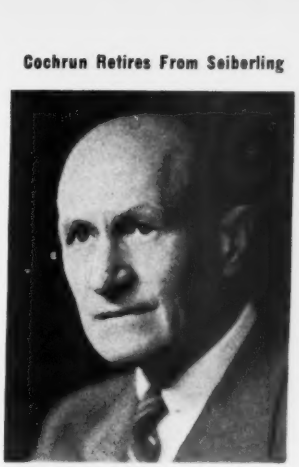
Begin New Goodyear Negotiations

Negotiations between the Goodyear Tire & Rubber Co. and the United Rubber Workers of America on a new company-wide contract were scheduled to start on January 9. The present agreement, covering working conditions for Goodyear employees in nine plants, expires on February 10. Both sides have agreed to open contract talks in an effort to reach an agreement before the expiration date. Wages are not involved in these discussions.

Kemp to Discuss Research

Dr. A. R. Kemp, who spent some 30 years with the Bell Telephone Laboratories, and who is currently a special consultant to the General Staff of the U. S. Army, is scheduled to be the principal speaker at the meeting of the Northern California Rubber Group to be held on January 25 at Berkeley, Calif. Dr. Kemp will discuss his 30-odd-year experience in rubber research.

Cochrun Retires From Seiberling



James Lee Cochrun

James Lee Cochrun, executive vice-president of the Seiberling Rubber Co., and an associate of F. A. Seiberling for the past 30 years, retired on December 31, 1950. Mr. Cochrun first reported to work when Mr. Seiberling was president of the Goodyear Tire & Rubber Co. in 1920. When Mr. Seiberling left Goodyear and started the Seiberling Rubber Co., Mr. Cochrun came to the new company. In the future, Mr. Cochrun will devote his full time to Cochrun Industries, Inc., an Akron firm which will act as export agent for several small Ohio companies. All but the last two years of Mr. Cochrun's association with Seiberling Rubber were spent in sales work. He was made executive vice-president in 1948. Mr. Cochrun has been a director of the firm since 1941. He is also president of the Seiberling Rubber Export Co., an overseas sales subsidiary. During World War II, Mr. Cochrun served as commander of the U. S. Citizens Defense Corps for Summit County, and later went to Washington, D. C., to assist John Collyer, president of the B. F. Goodrich Co., when Mr. Collyer was director of rubber programs for the War Production Board. When Mr. Cochrun went to Goodyear in 1920 he closed a distinguished military career that spanned more than 14 years. He entered service as a lieutenant in the Philippine Constabulary in 1906, and retired as a lieutenant colonel after World War I. Mr. Cochrun is a 32nd Degree Mason and was the first vice-commander of the American Legion in Ohio.

Extends Coverage on Cooke Line

The Wetherbee Chemical Co. of Buffalo, N. Y., which is headed by Burt Wetherbee, is extending its coverage of the chemical colors and color dispersions of the Cooke Color & Chemical Co. to include the State of Michigan. The company has represented the line in New York State for some time.

In order to assure an early publication date, questionnaires for the 1951 RUBBER RED BOOK should be completed and returned as quickly as possible!

AIM Awards to Four Companies

Four rubber companies are among the 238 firms throughout the United States and Canada which have received "Certificates of Management Excellence" for the year 1950 from the American Institute of Management, New York 3, N. Y. The awards, which will be bestowed annually hereafter by the Institute, are based on its continuing study of more than 2,000 leading concerns. The study is designed to provide a base for research into corporate policies and procedures. The four rubber companies are the Firestone Tire & Rubber Co., the B. F. Goodrich Co., and the Goodyear Tire & Rubber Co. all of Akron, Ohio, and Raybestos-Manhattan, Inc., Passaic, N. J. In weighing the merits of each management, credits are given for excellence in a number of separate fields including economic function, corporate structure, health of earnings growth, fairness to stockholders, research and development, directorate analysis, fiscal policies, production efficiency, sales vigor and executive evaluation.

Tire Makers Delay Price Rises

Tire manufacturers have temporarily suspended price increases ranging from 12.5 to 18.5% at the request of Michael V. DiSalle, Director of Price Stabilization. The agreement came shortly after major tire companies had announced price rises scheduled to take effect on January 1, 1951. The increases, initiated by the Goodyear Tire & Rubber Co., applied to original equipment tires only, and were reported to range from 12.5% on passenger car tires to 18.5% on some truck and bus tires. Mr. DiSalle discussed the situation with officials of six tire companies on January 3, but no conclusions were reached. The companies agreed to supply ESA with cost data which was to have been submitted on or about January 10. Meanwhile, the price increases were not put into effect. ESA has promised to make the earliest possible decision on whether to call for or order permanent withdrawal of the increases.

Cabot Planning Another Plant

Godfrey L. Cabot, Inc., of Boston, Mass., has announced that a site has been acquired for a new carbon black plant at Bayou Sale, St. Mary Parish, Louisiana. The Cabot Carbon Co., the manufacturing subsidiary, contemplates the construction of a thermal black plant of 30,000,000 pounds annual capacity and an adjoining oil furnace black plant of 50,000,000 pounds annual capacity. Negotiations for a natural gas supply, raw material for the thermal black, have been completed. The oil furnace units will operate on liquid hydrocarbons. The thermal blacks will be produced specifically for the rubber industry and some of the output is to be further processed into a high purity, metallurgical carbon for use in the production of steel. The oil furnace black unit will represent an important addition to the supply of HAF and FEF carbon blacks made necessary by the increasing volume of "cold rubber" in the Government's synthetic rubber program.

DETROIT HOLDS XMAS PARTY; ELECTS OFFICERS FOR 1951

Approximately 500 members and guests of the Detroit Rubber and Plastics Group attended the annual Christmas Party held on December 8 at the Detroit-Leland Hotel in Detroit, Mich. The meeting featured an election of officers for 1951. Members elected to office include: *Chairman*, G. F. Lindner (Minnesota Mining); *Vice-Chairman*, G. R. Cuthbertson (U. S. Rubber); *Treasurer*, E. V. Hindle (U. S. Rubber); *Assistant Treasurer*, W. F. Bauer (Brown Rubber); *Secretary*, G. P. Hollingsworth (Minnesota Mining); *Assistant Secretary*, H. W. Hoerauf (U. S. Rubber).

Members named to head the various committees include: *Program Chairman*, W. J. Simpson (Chrysler); *Assistant Program Chairman*, E. W. Tillitson (Wayne University); *Entertainment Chairman*, H. W. Neale (Pioneer Latex); *Assistant Entertainment Chairman*, J. B. Ledden (DuPont); *Publicity Chairman*, R. C. Chilton (Permalastic Products); *Assistant Publicity Chairman*, J. B. Craft (General Tire); *Membership Chairman*, B. M. Holmes (Ford); *Assistant Membership Chairman*, H. V. Beckerleg (Fisher Body); *Educational Chairman*, J. T. O'Reilly (Ford); *Assistant Educational Chairman*, V. H. Vodra (Wyandotte Chemicals).

W. B. Davis (Kaiser-Frazer), T. W. Halloran (Chemical Products), E. J. Kvet (Baldwin Rubber) and G. M. Wolfe (Sharples Chemicals) were elected to serve as counselors for 1951. The next meeting of the group is scheduled for February 16 at the Detroit-Leland Hotel when Dr. Thomas Gresham (Goodrich Chemical) will speak on "Polyacrylic Rubber".

Akron Changes Symposium Plans

A Symposium on Quality Control by Statistical Methods will feature the meeting of the Akron Rubber Group to be held on Friday, February 2, at the Mayflower Hotel in Akron. Originally, a Symposium on New Compounding Materials had been scheduled. The principal speaker at the symposium will be William H. Smith, manager of the analysis department of the Ford Motor Co. The symposium panel will include Joseph Torrey (Goodyear), H. J. Harmon (General Tire), L. M. Freeman (Goodrich), M. E. Marks (Columbia Chemical), and R. J. Luebbers (Firestone). The symposium will start at 3:00 P.M. and will be followed by a social hour and dinner at 7:00 P.M. The evening program includes a talk by Herman Hickman, famed coach of Yale University. Because the annual symposium program has become a highlite of the group's activities and has attracted increasingly large audiences, it has been decided to limit attendance this year to members and new applicants for membership. Applications will be accepted up to the time of the meeting itself.

An achievement plaque for work in public relations has been awarded to the Firestone Tire & Rubber Co. by the American Public Relations Association.

Microfilms Available

As previously announced, microfilms of copies of RUBBER AGE are now available from University Microfilms. Even though these films are prepared at a high reduction ratio, they are remarkably clear and sharp, and when used with a reader giving enlargement of 19 times or more, they are entirely satisfactory. A microfilm of Volumes 66 and 67 of RUBBER AGE covering the periods from October, 1949-March, 1950 and April-September, 1950, respectively, is currently available. This combined microfilm is available at moderate cost from University Microfilms, 313 North 1st St., Ann Arbor, Michigan.

Boston Group Elects Officers

An election of officers for the 1951 season featured the Annual Christmas Party of the Boston Rubber Group held on December 15 at the Somerset Hotel in Boston, Mass. The program for the party consisted of a cocktail hour, dinner, entertainment and the presentation of door prizes. At the brief business session, new by-laws as prepared by the By-Law Committee were approved by the members. Officers elected for the 1951 season include: *Chairman*, Thomas Edwards (Acushnet Process); *Vice-Chairman*, John Andrews (Godfrey L. Cabot); *Secretary-Treasurer*, A. W. Bryant (Binney & Smith). W. F. Malcolm (Titanium Pigments) and J. A. Williams (Haartz-Mason) were elected to the Executive Committee.

Chicago Group Holds Xmas Party

The Chicago Rubber Group held its Annual Christmas Party on December 15 at the Morrison Hotel in Chicago, Ill., with about 750 persons in attendance. Every lady present was given an attractive and useful Christmas gift. After dinner a program of entertainment and dancing was presented. Maurice J. O'Connor (C. P. Hall) served as chairman for the Christmas Party Committee. Other committee members included Robert L. Campbell, William A. Cary, John C. Gallagher, John Groot, Eli H. Grossman, Lawrence W. Heide, and Ralph Schell.

New York Christmas Party Held

The Annual Christmas Party of the New York Rubber Group was held on December 15 at the Henry Hudson Hotel in New York City. A cocktail hour preceded the serving of dinner which was followed by a program of entertainment. Approximately 500 members and their guests attended. The evening was concluded with a drawing for many attractive and useful prizes.

Manufacturers! Suppliers! Have you completed and returned your 1951 RUBBER RED BOOK questionnaires?

NO. CALIF. HOLDS XMAS PARTY; ANNOUNCES ELECTION RESULTS

The Northern California Rubber Group held its Eighth Annual Christmas Party on December 11 at the Willows in Orinda, Calif. The party featured programs of dancing and entertainment and the presentation of door prizes. An excellent dinner was served to the assembled members and their guests.

Subsequent to the Christmas Party, the results of a letter ballot for the election of officers for the 1951 season were announced. Members elected to office include: *President*, John B. Watson (Goodyear); *Vice-President*, Neil McIntyre (Oliver Tire); *Secretary*, Grover Ramsey (Grove Regulator); *Treasurer*, James Sanford (American Rubber).

R. E. Burke (Burke Rubber), George Farwell (Goodyear), John Mason (Pioneer Rubber) and Fred W. Swain (Pioneer Rubber), the outgoing president, were elected to the Executive Committee for 1951.

Southern Ohio Holds Party

The Annual Christmas Party of the Southern Ohio Rubber Group was held on December 16 at the Miami Valley Golf Club in Dayton, Ohio. The evening was devoted to dinner, dancing, card games, and the distribution of door prizes. New officers for the 1951 season, recently elected by letter ballot, were introduced. The new officers include the following: *Chairman*, Louis J. Keyes (Dayton Rubber); *Treasurer*, Frank E. Newton (Dayton Rubber); *Secretary*, Russell J. Hoskin (Inland Mfg.). Jack E. Feldman (Inland Mfg.) was named chairman-elect. The following members were elected directors for the 1951 season: Bill Whittaker (Herron & Meyer), Roger Hickernell (Inland Mfg.), Ralph Appleby (DuPont), Herb Karch (C. P. Hall), Joe Rockoff (Dayton Rubber), John Walsh (Xylos Rubber), Bob Radow (Dayton Rubber), Jack Feldman, George Lang (Premier Rubber), and Bob Sucher (Inland Mfg.).

Buffalo Group Elects Officers

The annual Christmas party of the Buffalo Rubber Group, held on December 19 at the Elks Club in Buffalo, New York, featured an election of officers for the 1951 season. Members elected to office include: *Chairman*, Paul Sick (Hewitt-Robins); *Vice-Chairman*, Fred Kohlhagen (Globe Woven Belting); *Secretary-Treasurer*, Raymond Lowry (Hewitt-Robins). The following members were elected to the Executive Committee for 1951: Charles Miserentino (Dunlop Tire), Glen Meyers (James O. Meyers), Fred Ball (Pierce & Stevens), Talbert MacConnell (U. S. Rubber Reclaiming), Oren Ferster (Queen City Rubber), and William Butler (Socony-Vacuum). The assembled members and their guests enjoyed a gala Christmas dinner. Door prizes were provided for lucky ticket holders, while a program of entertainment added to the evening's festivities.

ROSE OFFERS YEAR-END RESUME OF SCRAP ACTIVITIES IN 1950

Henry Rose, associated with H. Muehlstein, Inc., Akron, Ohio, and president of the Scrap Rubber Institute of the National Association of Waste Material Dealers, in a year-end statement reviewed activities in the scrap rubber market during 1950. Mr. Rose stated that pricewise the year 1950 resembled 1949 when it started. Consumers buying tires in the Akron area at $13.50 per ton were still reducing inventories and as late as April, 1950, refused to pay $14.00 for scrap tires. Inventories were slowly but surely going back to a position that encouraged volatile fluctuations in the event of any increased demand for reclaimed rubber, Mr. Rose asserted.

Crude rubber, which had been plodding along in the 18c area, suddenly started moving upward and, with conditions in the Far East very unsettled, it did not take long for natural rubber to hit 28c, then 36c by July and the spiral had started, reaching a high of between 85c and 90c per lb. This situation created an unprecedented demand for reclaimed rubber so that with extremely low inventories and high demand for scrap rubber, all reclaimers came into the market at the same time.

The $13.50 per ton price in the Akron area permitted shipments to Akron markets from an area of not over 250 miles and similar conditions existed in other consuming areas. In order to bring in scrap tires from outlying territory, some mills paid as high as $45.00 per ton. This brought out substantial quantities of scrap tires that had been lying idle in distant points and temporarily satisfied consumer demand. Tires receded gradually to a $25.00 basis in October and have since leveled at $30.00 per ton. Black inner tubes which had been selling at around 4½c the early part of the year climbed to around 12c per lb.

Synthetic rubber, which had been looked upon as the stabilizing influence in the rubber picture, fell far short of its demand and although production of Government rubber is scheduled for large increases, the price has now been raised from 19¼c per lb. delivered to 25½c delivered. This still gives the reclaimers a large field in which to work pricewise.

The demand for scrap rubber should be good in the near future but prices will depend a good deal on any government stabilization program, Mr. Rose concluded.

Snell Forms Mexican Firm

Foster D. Snell, Inc., New York 11, N. Y., has formed a new Mexican company, Foster D. Snell de Mexico S. de R. L. at Apartado 20.609, Mexico City. It is expected that the new firm will confine its activities to consulting, development and engineering problems in Central America, particularly in Mexico. J. Carner and J. Sperling will be in charge of the Mexican subsidiary and will be available for consultation. It is expected, that for the present, laboratory and engineering facilities at New York City and Bainbridge, N. Y., will suffice.

NAUGATUCK NAMES SALES PERSONNEL FOR LATICES AND DISPERSIONS

C. H. Allard

C. L. Howard

A. Thomas

D. L. L. Keefer

A series of new appointments for the sale of latices and dispersions produced by the Naugatuck Chemical Division of the U. S. Rubber Co., as well as the opening of a new area office in Charlotte, N. C., were recently announced. The new area office has been opened at 611 West Fifth Street, Charlotte, to give more complete service to the states of North and South Carolina, Georgia, Florida, Tennessee, Alabama and Louisiana. Claude H. Allard has been named technical representative covering these states from the Charlotte office. Charles L. Howard has been named technical representative for the Akron, Ohio, territory, succeeding Albert J. Marshall, now owner of the Ryan Rubber Co. of Dallas, Texas; Arthur Thomas has been appointed assistant to the sales manager of latices and dispersions, and D. Leete L. Keefer has been appointed technical representative in Connecticut and upper N. Y.

Chemical Firms Announce Merger

Plans for the merger of the Food Machinery & Chemical Corp. of San Jose, Calif., and Ohio-Apex, Inc., of Nitro, W. Va., were recently announced. Under the agreement, Food Machinery will offer one share of its stock to Ohio-Apex stockholders for each three shares of their common stock. The pact further provides that Ohio-Apex will be incorporated into the Chemical Division of Food Machinery, but no change in management personnel is contemplated. The consolidation move is expected by the two concerns to provide a stronger distribution organization for both and, additionally, to strengthen Ohio-Apex's position by assuring it a source of certain basic raw materials used in its manufacturing processes. Ohio-Apex's capitalization consists solely of 499,995 shares of common stock. At the end of 1949, Food Machinery had outstanding $15,988,000 of funded debt, $18,619,900 of preferred stock, and 2,112,749 shares of common stock.

PVA Copolymer Emulsions

Polyvinyl acetate copolymer emulsions, which are said to overcome brittleness and inadequate resistance to grease and solvents in resilient floorings, have been introduced by the American Polymer Corp., Peabody, Mass. Called Polyco 1673-37-B emulsions, the new materials are reported to permit the laying of different types of floors. This is made possible by varying the content of the polyvinyl resins and the type or fineness of the fillers in the composition. Plasticity of the emulsion solids influences the degree of flexibility and resilience desired. The new emulsions are available in a wide range of properties, including solid content, molecular weight, particle size, particle charge and viscosity.

Mate-Rite Balance Aide

What is described as one of the biggest advancements in tire service operations in some time has been developed by the Goodyear Tire & Rubber Co. as an aid to the firm's dealers. The achievement is a new device named the "Mate-Rite Balance Aide," which is used for mating tires and tubes properly when mounting so as to obtain better balance. The Mate-Rite is not a balancing machine. Its purpose is to locate quickly the "light" and "heavy" spots in tires and tubes. Then, by mating the light spot on the tire with the heavy spot on the tube, the amount of lead weight formerly required in tire balancing may be greatly reduced. Before mounting, each tire is placed on the device to locate the light spot and chalk-marked accordingly. Next, the heavy spot on the tube is located and marked in the same manner. Tire and tube are then mated by placing the chalk marks together.

ESD Flexicast Compound

The Engineers Specialties Division of the Universal Engraving & Colorplate Co., Inc., 980 Ellicott St., Buffalo 9, N. Y., is currently marketing ESD Flexicast Compound, described as a synthetic resinous material for making molds which are flexible yet accurate and permanent when properly cured. A ready to use cold-pour, semi-liquid which requires no mixing, the compound is said to have practical and valuable applications in inspection operations and is particularly recommended by the company for taking impressions of internal contours such as internal threads. Tests of Flexicast are reported to have shown shrinkage to average about 1%. A technical bulletin describing use of the material is available from the company on request.

NPA Rubber Staff Expanding

Due to the control situation in the rubber field, the staff of the Rubber Division, Industry Operations Bureau, National Production Authority at Washington now numbers over 25 workers. A review of staff activities should prove of interest.

Earl W. Glen, chief of the division, personally makes decisions on appeal cases and adjustments, in addition to his regular duties. On interdepartmental committee details, either E. G. Holt, who is assistant divisional chief, or John Caswell serve as alternates for Mr. Glen when occasion warrants. In addition to his usual work in connection with industry economics and economics of rubber materials, Mr. Holt also has a "trouble shooter" assignment, handling a variety of difficult correspondence falling in this category. William Small assists Mr. Holt in the field of rubber materials, with emphasis on the international statistical aspects.

On appeal cases, the paper work, letters, recording and notification of allocations to R.F.C., after the determinations are made, is distributed between Mr. Caswell, Aden Miller, Lester Waldron, George Scott, and Thomas Curley, aided by a limited stenographic-clerical staff. Mr. Caswell also handles various special assignments, while Mr. Miller sits in with Mr. Glen on meetings with technical subcommittees covering non-transportation products.

Herbert James continues in general charge of the Statistical Section, with Saul Drimmer and Earl Wade as high right and left bowers. The statistical staff has been increased materially to handle the increased and more detailed records now involved in control operations.

A part of the former rubber staff in the Office of International Trade has been transferred to the NPA Rubber Division. Earle Overley is now divisional contact man on ECA matters, handles consultant duties on export control work, and handles the general field of foreign trade and field reporting in rubber products. Andrew Paddock has a temporary assignment with the division on a special research task. Mr. Holt has general supervisory jurisdiction over their work.

Urges Rigid Airship Construction

Immediate steps for a transport airship construction program to meet the need for speedier, long distance and large tonnage hauling of war material was recently urged by Paul W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co. Mr. Litchfield, who has had a long-standing interest in aircraft and whose company is equipped to produce rigid airships, noted the use of such vessels would reduce the danger from submarine warfare and promote fuel economy. The airships, he said, could carry much greater loads than the largest cargo planes and at speeds three or four times as fast as surface ships. A construction program should be started without delay, he declared, for "while the fighting may end in Korea, we have had our warning. The threat to national security and world peace will remain. And rigid airships, like battleships and carriers, take a long time to build."

Vaught Retires From Goodrich

George W. Vaught

George W. Vaught, financial vice-president of the B. F. Goodrich Co. since 1940, retired on December 31, 1950. When he joined the company more than 10 years ago it was Mr. Vaught's intention to retire to his ranch in Texas at the end of 5 years of active service. At the request of President Collyer and the board of directors he agreed to continue his responsibilities an additional five years ending December 31, 1950. Born in Texas in 1888, Mr. Vaught was educated at Southwestern University, Georgetown, Texas, and became a teacher of high school and college mathematics in Texas. He also served as coach and athletic director during his teaching days. He began his business career with the First National Bank of Port Arthur, Texas, in 1914 and joined Montgomery Ward and Co. in 1917. After extensive experience in accounting and merchandising divisions of that company he was elected treasurer in 1933 and a director in 1936. Mr. Vaught has spent his vacations for many years on his west Texas ranch where he raises Hereford cattle and Palomino horses.

Standard Cable Gets RFC Loan

Standard Cable Co. of Chickasha, Okla., has received a loan of $775,000 from the Reconstruction Finance Corporation for use as working capital and for buying additional machinery and equipment for the production of insulated wires, cables and cord sets. The loan, authorized by the RFC on December 30 under instructions from the National Production Authority, was the first loan granted from funds provided by Congress for expansion of defense-needed output. The funds will be available to Standard Cable for a period of nine months from the date of authorization and will be charged at 5% interest. The Defense Production Act recently passed by Congress provided $600,000,000 in immediate lending authority to get an expansion in defense output. Congress said in the act that $1,400,000,000 additional would be provided for these loans if required.

Efficiency of Air-Filled Tires

The efficiency of air-filled tires in comparison with water-filled tires was indicated in a paper recently presented before the winter meeting of the American Society of Agricultural Engineers in Chicago, Ill. The paper, by J. W. Shields, manager of the Farm Tire Division, Development Department, U. S. Rubber Co., and I. F. Reed, senior agricultural engineer of the Tillage Machinery Laboratory of the U. S. Department of Agriculture, reported the results of a series of controlled tests indicating that air-filled tires are more efficient and operate more economically than either 100% water-filled or partially water-filled tires in different soils under uniform conditions. The tests were conducted on a cooperative basis by the Department of Agriculture and U. S. Rubber on the Tillage Machinery Laboratory Soil Plots at Auburn, Ala. Tires were tested in sand and loam at working consistency with identical 11-38 4-ply lug type tires to determine the relative efficiency of the air-filled tire against the liquid weighted variety. Wheel weights were added to the air-filled and partially water-filled tires to bring the total weight up to that of the 100% water-filled. The tests were designed to compute travel efficiency, force efficiency, power efficiency and rolling resistance at different draw-bar pulls. Results clearly indicated that the air-filled tire gave the best performance in both soils and the 100% liquid tire gave the poorest.

British Synthetic Program Urged

G. E. Beharrel, managing director of the Dunlop Rubber Co., Ltd., in a recent address before the Institution of the Rubber Industry in London, Eng., stated that if a synthetic rubber industry was developed in Britain, "it could count on the cooperation of the consumers." Even under conditions of an assured world peace, Mr. Beharrel said, there were prima facie reasons for examining the suggestion. There is a field for special types of synthetic rubber which appear to form a basis for future expansion on an economic basis, he said. "When United States stockpiling is completed," continued Mr. Beharrel, "it is difficult to visualize return of the synthetic rubber industry to volumes which were under contemplation only 12 months ago." He said that tire output per man between 1925 and 1950 in Great Britain had progressed to such an extent that Britain is now making four times the output with the same number of workers.

Wooster Sales Show Increase

According to J. Robert S. Conybeare, general sales manager, the Wooster Rubber Co. of Wooster, Ohio, enjoyed an over-all increase of 35% in sales in 1950 over the previous record year of 1949. Sales increases of the company's Rubbermaid housewares line amounted to 36.4% through department store outlets and 56.4% through wholesalers, while Rubbermaid Kar-Rugs and the company's allied factory sales showed increases of 19.2%.

ONTARIO RUBBER SECTION HEARS COKE AND QUIG TALK ON FIBERS

Approximately 80 members and guests of the Ontario Rubber Section of the Chemical Institute of Canada attended the meeting held on December 12 at the University of Toronto in Toronto, Ontario, Canada. The meeting featured a symposium on fibers. Principal speakers were Dr. C. E. Coke, manager of industrial sales and industrial sales development for Courtaulds (Canada) Ltd., and Dr. J. B. Quig, manager of the Development Section of the Rayon Department of E. I. duPont de Nemours & Co., Inc., Wilmington, Del. Dr. Coke spoke on "High Tenacity Viscose Rayon," while Dr. Quig spoke on "Nylon, Orlon and Fiber V."

Dr. Coke first reviewed the history and methods of rayon manufacture and pointed out that the output of viscose rayon in Canada during 1950 would be of the order of 32 million pounds. The first high tenacity rayon, called "Tenasco," was produced in 1935. The yarn strength of this material was about 3.8 grams per denier (as against 2.0 grams per denier for normal rayon) and had an elongation at break of 8 to 9%. Tenasco was first produced at 275 denier but the size was later increased to 1100 and then to 1650 denier. The most important physical characteristics of high tenacity rayon are (a) strength (b) elongation at break, and (c) fatigue resistance.

Dr. Coke presented data indicating that with rayon one can obtain a stronger tire with a thinner carcass than one can with cotton, and also pointed out that high tenacity rayon is capable of precise control of filament and uniformity. Besides tires there has been considerable interest in the use of rayon in such articles as hose, V-belts, conveyor and transmission belts, tapes and such fabrics. To recapture some of the market from high tenacity rayon, cotton would have to reach a price of 20c a lb.

Talk on DuPont Fibers

In his address on "Nylon, Orlon and Fiber V," Dr. Quig reviewed the chemical background of the three fibers and went on to compare and contrast their properties. The common properties are high strength, high flex life, high elastic recovery, good abrasion resistance, water insensitivity, ability to be heat set and freedom from attack by molds, fungi and bacteria. Except in blends, nylon is not suitable for suiting material but when blended with other fibers it will be observed that creases are maintained much longer. Orlon (polyacrylonitrile) is characterized by its exceptional out-door durability and resistance to acids. Fiber V, which is derived from terephthalic acid and ethylene glycol, possesses lower growth, greater dimensional stability and better heat aging properties than nylon.

These fibers permit the production of fabrics and garments which have approximately equivalent wet and dry tensile strength, good resistance to soiling, ready launderability, quick drying and dimensional stability in both the dry and wet state. Nylon has industrial potentialities due to a high breaking elongation and low initial modulus. Tires made from nylon have never blown out and have proven economical for some classes of trucking and off-the-road tires. Orlon is potentially useful due to a high out-door durability, resistance to sunlight, smoke and soot. Fiber V with its high modulus is useful in V-belts and high pressure fire hose, Dr. Quig concluded.

NOV. CONSUMPTION DROPS 17% INDICATING EFFECT OF CUTBACKS

New rubber consumption in the month of November, 1950, declined 17.75% to 97,816 long tons from the 118,917 tons consumed in October, 1950, according to a recent report of the Rubber Manufacturers Association. The decline in rubber consumption was attributed to the limitation orders issued by the Government aimed at conserving natural rubber. November was the first month since April, 1950, that the consumption of new rubber fell below 100,000 tons.

Consumption of natural rubber during November was down 25.13% to 50,814 long tons from the 67,868 tons used in October. Use of synthetic rubber in November totaled 47,002 long tons, a decline of slightly under 8% from the 51,049 long tons consumed in the previous month. Consumption of reclaimed rubber in November was estimated at 29,805 long tons, 7.61% less than the 32,260 long tons consumed in October.

Establish NPA Facilities Bureau

In a move to speed up industrial expansion needed for defense and to expedite related defense construction, the NPA has established a Facilities and Construction Bureau. Five divisions have already been established within the new bureau covering, respectively, industrial expansion, tax amortization, loans, building materials, and construction controls. Frank R. Creedon, who had been director of NPA's Facilities Clearance Staff, has been appointed Assistant Administrator in charge of the new bureau. Mr. Creedon, an M.I.T. graduate, directed the government construction program of ordnance and chemical warfare plants in 1942, and later became Deputy Rubber Director in charge of construction for the synthetic rubber program.

Cabot Named to Federal Post

Thomas D. Cabot, vice-president of Godfrey L. Cabot, Inc., of Boston, Mass., was recently named by President Truman as chairman of the Committee on International Security Affairs. Mr. Cabot, a newcomer to the Federal Government, will occupy his new position by virtue of his nomination as director for International Security Affairs, a new office to be opened in the State Department. The function of the new committee is the handling of international security matters and military and economic assistance for mutual defense.

Are your questionnaires for the 1951 RUBBER RED BOOK completed? Your prompt attention will be appreciated!

NATURAL PRODUCTION IN OCTOBER HITS NEW HIGH OF 180,000 TONS

World production of natural rubber in October, 1950, reached 180,000 long tons, breaking all existing records, according to estimates of the Secretariat of the Rubber Study Group. This compares with the 165,000 tons produced in September and the 125,000 tons produced in October of 1949. The previous high was 172,500 tons attained in July and August of 1950.

In the first ten months of 1950, production was estimated at 1,512,500 tons, up 25.3% from the 1,207,500 tons estimated in the first ten months of 1949. World production of natural rubber in the first ten months of 1950 exceeded consumption by 132,500 long tons, the Secretariat estimated.

Malayan output in October was about 61,800 long tons and rubber exports from Indonesia in October were calculated at the record-breaking figure of 76,353 long tons. Shipments of estate rubber were reported at 13,791 long tons and shipments of native rubber were calculated at the tremendous figure of 62,562 long tons.

World new rubber consumption, breaking the short-lived September record by 20,000 tons, reached 217,500 tons in October. In October of 1949, the figure was estimated at 167,500 tons. Of the October, 1950, total, 162,500 tons were natural and 55,000 tons synthetic. For the first ten months of 1950 new world rubber consumption was estimated at 1,842,500 long tons, of which 1,380,000 tons were natural and 462,500 tons were synthetic.

Ample Carbon Black Available

At a meeting held in Washington, D. C., on December 15 with the leading producers of carbon black, officials of the National Production Authority were informed that the carbon black balance sheet for the immediate future looks good on the basis of present defense and civilian demand. The producers warned, however, that meeting of 1951 requirements will depend in large part on how greatly synthetic rubber production increases. Since meeting future requirements hinges partly on expansion efforts now under way, spokesmen said they were seriously concerned about procuring steel and other materials needed to enlarge capacity. NPA officials were reported as willing to expedite procurement of essential building materials. NPA is also expected to request carbon black producers to report estimated 1951 production, sales and expansion plans in order to keep careful tabs on the developing supply-and-demand picture.

DuPont Technical Bulletins

Among new technical bulletins recently issued by the DuPont Rubber Chemicals Division, Wilmington 98, Delaware, are the following: Thionex-MBTS Combinations as Accelerators for Rubber and GR-S (Bulletin BL-239) and Effect of NA-22 on the Stability of "Sulfur-Modified" Neoprene Stocks (Bulletin BL-240). Copies of the bulletins are available from the company on request.

PAPER-PLASTICS CONFERENCE SPONSORED BY PLASTICS COMMITTEE OF TAPPI

Approximately 270 members of the Technical Association of the Pulp and Paper Industry attended the Paper-Plastics Conference sponsored by the Plastics Committee of the group which was held on October 19 and 20 at the College of Forestry of the State University of New York at Syracuse, N. Y. Both morning and afternoon sessions were presented on the two days of the meeting.

On the morning of October 19, a number of papers were presented on "Properties of Plastics in Relation to Papermaking." The afternoon session of the same day came under the heading of "Beater Addition Fundamentals." The third session of the conference was held on the morning of October 20, and was entitled "Cellulose—Accessibility, Reactivity and Properties Relating to Plastics." The afternoon session was devoted to "Plastic Coating Fundamentals."

Among the 16 papers presented at the conference, several were of particular interest to the rubber manufacturing field. One of these was entitled "The Effect of Latex Variables in Beater Addition of Nitrile Latices" by D. M. Yost of the Sorg Paper Co. and William H. Aiken of the Goodyear Tire & Rubber Co.

Paper on Nitrile Latices

This paper, presented by Mr. Aiken, was the first of two on nitrile latices. Mr. Aiken pointed out that a number of nitrile rubber latex variables have been studied to determine their effect on beater impregnation, but that work was limited to latices prepared with one basic polymerization system and to a medium beaten Scandinavian unbleached kraft pulp. Optimum properties were obtained with a rubber of medium acrylonitrile content and molecular weight with no additional stabilization after polymerization.

With alum as a coagulating agent optimum properties were obtained at a final pH range of 4.5 to 5.5. Somewhat better properties were obtained by coagulating with a 100-20 mixture of alum-sodium hydroxide at a final pH of 5.5 to 6.5. Coagulation with acids or acid-alum mixtures is to be avoided because it, as well as final pH values above 6.5, causes sticky sheets.

Although vulcanizing of the latex after coagulation appears to give a beneficial effect, this is offset by losses in properties brought about by the extra stabilizer that must be added along with the curing ingredients. Plasticizers improve drape and softness but decrease strength. Both stretch and edge tear are increased almost linearly with increased amount of latex while tearing strength progressively decreases. Bursting strength increased to a maximum while tensile tended to decrease.

Certain Papermaking Variables

Another paper presented at the conference was "The Effect of Certain Papermaking Variables in Beater Addition of Nitrile Latices," also by Messrs. Yost and Aiken, and presented by Mr. Yost. In this paper, Mr. Yost pointed out that the latex may be added to the pulp either before or after beating, but that it should not be coagulated until near the end of the beating processes.

The amount of latex that could be incorporated in a beaten unbleached kraft pulp was greatly increased by reducing the pulp consistency. For latex contents up to 33 parts per 100 parts of pulp, better properties were obtained the higher the pulp consistency. For greater amount of latex, better properties were still obtained at the high pulp consistency. For greater amounts of latex, that is, above 33 parts per 100 of pulp, better properties were obtained at lower pulp consistencies. Unbeaten bleached kraft pulps showed a greater tolerance for latex than unbeaten unbleached kraft pulps. However, beating bleached pulps did not increase their latex tolerance whereas the amount of latex that could be incorporated into unbleached kraft pulps was increased by beating.

Addition of latex increased the elongation and reduced the stiffness of all pulps tested. Effect on other properties depended to a great extent on the type of pulp used. The addition of latex showed little effect on drainage properties. The stretch and tearing strength of latex-containing sheets relative to sheets not containing latex remained the same with variation in basic weight. Edge tear, bursting strength, and tensile strength, on the other hand, showed relatively higher values at the higher basic weights.

The addition of rosin size appeared to give no difficulties in latex-pulp systems. The addition of clay, however, reduced physical properties. It would appear that pulps may be dyed, but that best results are obtained when the color is added after the latex but before the alum.

The wet broke can be easily reworked with no appreciable reduction of properties. The dry broke on the other hand is hard to disperse and gives reduced properties. Mr. Yost pointed out that a mill run has been made with the latex developed in these studies, and that results obtained were in excellent correlation with the laboratory studies.

Phenolics in Nitrile Rubber

A paper on "Phenolic Resins in Paper Modified by Acrylonitrile Rubbers" by R. C. Bascom of the B. F. Goodrich Chemical Co. was also presented at the TAPPI conference. Mr. Bascom pointed out that phenolic resins are being used in nitrile rubbers as reinforcing resins to increase toughness and abrasion resistance and are used for such widely divergent applications as bonding automobile brake shoes to linings and bonding shoe soles to shoes.

The introduction of nitrile rubber in conventional phenolic molding compositions causes pronounced changes in physical properties. Nitrile rubber phenolics withstand shock loads of from 1½ to 8 times greater than phenolics alone before first signs of failure and withstand shock loads of from 2-15 times greater than straight phenolics before complete failure.

Mr. Bascom pointed out that the problem is to develop means of taking advantage of these desirous properties using methods and equipment available to the paper industry. He described laboratory experiments following techniques described by Snyder and his co-workers. Pulp stock in the beater is added to an alkaline pH and the modified resin thoroughly dispersed with the roll lifted. The diluted phenolic resin is then run in at a point where maximum agitation is present. After a suitable dispersion time, the precipitating agent is added which will reduce the furnish to a point of 4.0 to 4.5.

Incorporation of nitrile rubber results in improved flow and increased impact strength. This property is particularly important in the production of laminates in that such laminates may be cold punched without fracture. When high impact compounds are used, the resin and rubber may be co-precipitated followed by dewatering, extruding and conditionings. When laminating papers saturated off the machine are molded, the resin flows away from the fibers resulting in a dense structure, and there is no evidence of flow of fibers or rupturing of the sheet.

Polyethylene For Paper Coatings

At the afternoon session on October 20, a paper on "Alathon Polythene Coatings—Properties and Techniques" was presented by Alfred Stockfleth of E. I. duPont de Nemours & Co., Inc. Mr. Stockfleth discussed the use of polyethylene for paper coatings from the point of view of its inert properties and its resistance to moisture vapor transmission. He contracted these properties in film formation and in hot melt applications. The resistance to moisture vapor transmission for the most part is the most important used property.

Mr. Stockfleth also brought out the stress-strain changes with temperature and showed that the polyethylenes were quite dimensionally stable. Polyethylene is useful at a wide range of temperatures which makes it particularly important in frozen food packaging. In the discussion following the paper Mr. Stockfleth pointed out that it is possible to look forward to the application of polyethylene to paper by means of organosol and aquasol coatings which, of course, are more directly usable by the paper industry.

Use of Styrene-Butadiene Latex

M. E. Wendt and William H. Aiken, both of the Goodyear Tire & Rubber Co., presented another paper at the conference entitled "The Effect of Compounding Variables on Styrene-Butadiene Latex Used for Protective Coatings for Paper." Mr. Wendt presented this paper and pointed out that such a study was made of the use of a coating composition of a butadiene-styrene copolymer latex, an emulsified wax, and a thickening agent.

Emphasis was on obtaining a coated paper with good grease resistance and a low water vapor transfer rate. Best results were obtained in combination with high melting point microcrystalline waxes. At least 30 parts of wax per 100 parts of latex solids were necessary to give low water vapor transfer rates. The use of a thickening agent improves resistance to passage of water vapor and also reduces the tendency toward foaming. The coating must be heated to a temperature of almost 180° F. to produce a continuous film of

coating on the paper. Maximum properties were obtained by fusion at 300° F.

In the laboratory with a 30 pound super-calendered kraft paper a water vapor transfer rate of 1 gram per 100 square inches for 24 hours was obtained with approximately 15 parts per ream of coating. The sheet also had excellent grease resistance. Mr. Wendt pointed out that the same results have been obtained with production equipment at half this coating weight, and that these properties were not appreciably affected by creasing the sheet.

"The Technology of Styrene Latex Paper Coating" by Eli A. Haddad of the Monsanto Chemical Co. was the title of still another interesting paper presented at the conference. Mr. Haddad reviewed the technology of styrene latices and their application to paper giving details with respect to one type of "Lustrex" latex. He pointed out that the formulation of "Lustrex" latex paper coating is still in the initial stages of development.

One of the main factors apart from plasticizer incorporation is the use of thickening agents and modifiers. Of particular interest is the use of an alkali soluble styrene copolymer which reacts with ammonia or alkali metal hydroxides to form water soluble salts. Mr. Haddad pointed out that the so called short medium and long formulation differ mainly in the concentration of plasticizer to resin. The difference in composition obviously yields products of varying degrees of flexibility.

Vinyls in Paper Coatings

The last paper presented at the conference was entitled "The Versatile Vinyl Enters the Paper Coating Feld" by A. L. Hatfield of the B. F. Goodrich Chemical Co. Mr. Hatfield described procedures for the formulation and application of vinyl chloride and vinyl chloride copolymer resins as plastisols, modified plastisols, solutions and latices.

He placed particular emphasis on latices masmuch as vinyls in this form can be handled by either an on - or - off - machine paper coating process. This flexibility of application makes it possible for the paper producer to coat his own board in the manufacture of grease and moisture proof paper products. Mr. Hatfield cited other applications for both functional and decorative vinyl coatings.

There were extensive discussions following the various papers. The question of antioxidants received considerable attention, after the papers by Messrs. Wendt, Aiken and Haddad. The consensus was that the question of whether or not an antioxidant should be added depends primarily on the end use of the products. It was agreed that whenever unsaturated solution is present in the copolymer, the addition of an antioxidant would be beneficial.

A new product and package unit which enables tire dealers to quickly and easily convert their regular air lines into handy gauging and inflating equipment has been introduced by A. Schrader's Son. Known as the Schrader No. 4718K Gauge Clamp-Airline Kit, it contains one gauge clamp and two gauges.

Dedicate Johnson Laboratory

S. C. Johnson & Son, Inc., dedicated its recently completed laboratory building in Racine, Wisc., on November 17. The company will carry on basic research in the new building, develop new products, and control the quality of wax products for home, industry, and agriculture. De-

signed by Frank Lloyd Wright, the 153-foot high building, as shown herewith, has hanging walls of brick and horizontal glass tubing, all supported by a hollow steel-reinforced concrete core. The glass-walled 15-story building suggests a giant chalice, so narrow is the core which supports the great tower. Scientists, educators, and industrial leaders from many parts of the country were present for the dedication.

Plans Ethanolamine Unit

Jefferson Chemical Co., Inc., New York 22, N. Y., has announced that it will begin manufacturing monoethanolamine, diethanolamine and triethanolamine this year in its plant at Port Neches, Texas. A contract has been awarded to C. F. Braun & Co. for construction of a unit for the ethanolamines, and completion is scheduled for the latter half of 1951. One of the raw materials which Jefferson will employ in manufacturing the ethanolamines is ethylene oxide, which it has been producing at the Port Neches location since 1948. In addition to ethylene oxide, Jefferson is currently producing ethylene glycol, diethylene glycol, ethylene dichloride, and related products.

Rubber Railroad Crossing Laid

What is said to be the first rubber railroad crossing of all time has been laid down at the Portage Path crossing of the Akron, Canton & Youngstown Railroad in Ohio. The formula, 50% ground rubber and 50% asphalt, was developed by the Research Department of the Goodyear Tire & Rubber Co. for the crossing test. Approaches on both sides of the crossing and the strip between the rails were surfaced with the new material. Goodyear believes that the resiliency of the rubber-asphalt mix will minimize railroad crossing troubles caused by the heavy weight of trains and the right angle battering from trucks and autos.

BERYLLIUM COPPER ALLOY USE URGED FOR MOLDING CAVITIES

The use of beryllium copper alloy for molding cavities to shorten cycle time and extend practical life of the molds is being urged by the General Mold Casting Corp., 1819 Broadway, New York 23, N. Y. In an address before a group of plastics engineers meeting at the Hotel Statler in New York City on November 12, Daniel Wurth, president of General Mold Casting, said although beryllium copper alloy has been known for many years as a tough hard alloy, its use by the plastic, rubber and ceramic industries for cores and cavities is comparatively new. The new technique is known as "pressure casting".

For precision work, he said, a steel hob is made in the customary manner. Instead of forcing this hob downward into mild steel to form molding cavities, the hob is set facing upward, in a retaining vessel. Then molten beryllium copper is poured into the vessel and when the hob is fully covered the contents are put under thousands of pounds of hydraulic pressure. This pressure not only forces the alloy into all the interstices of the hob, but forces out any entrapped gas, thus assuring high density of the material. Mr. Wurth observed that hobs having thin sections which cannot be forced into steel without breakage are daily being pressure cast with this alloy.

Beryllium Copper Conductivity

Due to the high thermal conductivity of beryllium copper, molding cycle time is reduced by as much as 30%. Tensile strength is 185,000 to 200,000 psi. The alloy from which pressure castings are made has a heat conductivity approximately 30% of that of pure copper. This property is of great advantage in injection molded plastic mold applications as it dissipates heat faster than steel.

Mr. Wurth stated that in plastic molds, pressure cast beryllium copper gives better wearing qualities than steel because it has a low modulus of elasticity which imparts a resilience to the cavity. This insures high resistance to abrasion, pitting and wear. For example, a little chrome in steel hardened to a lower Rockwell gives better wear than plain carbon steel hardened to a higher Rockwell. Grain structure and alloy content are the determinants of wear resistance, he said, and more molders are switching to the alloy constantly.

For cases where high precision is not required, inexpensive cast iron hobs can be used, saving 60% of the hob cost. The surface can be adequately polished and often molds requiring months for production in steel are delivered in weeks. Mr. Wurth told his audience that it is the new art of casting under high pressure which is bringing the use of beryllium copper into general use.

Phillips Petroleum Co. has announced that its glass blowing laboratory, located in Bartlesville, Okla., is now offering a complete service for the fabrication, modification or repair of glassware items of unusual or intricate design.

NEWS IN BRIEF

Kenrich Corporation has announced reductions of 4 to 7 cents a pound in the drum lot prices of its Kenflex plasticizers. Kenflex, a synthetic hydrocarbon resin available in both liquid and solid forms, is reported to be finding increasing application in vinyl insulation, plastisols, adhesives and coatings, and in various rubber compounds.

The formation of a new technical Committee on Sampling and Analysis of Atmospheric Pollution has been authorized by the board of directors of the American Society for Testing Materials. Dr. Louis C. McCable, of the U. S. Bureau of Mines, is temporary chairman of the new committee.

Korn-Kube, a new barrel polishing medium for rubber, plastics, wood, glass, and other materials, has been introduced by Kube-Kut, Inc., Garfield, N. J. The new material is composed of hardwood in cube form to which macerated corn cobs are added.

Plans for the construction of a $250,000 branch warehouse and office building in Cleveland have been announced by Minnesota Mining. It will be a one-story, steel and masonry structure, containing 30,000 square feet of floor space.

A dynamometer for testing brake linings and clutch facings has been installed in the Raybestos-Manhattan plant in Passaic, N. J. The inertia-type, heavy-duty unit is said to be the largest of its kind. Road speeds from creeping to 200 m.p.h. can be tested.

A colorful folder illustrating and describing the various products in the company's cycle tire line has been made available by Goodyear. It is intended as a sales tool for dealers and jobbers.

Ground was recently broken in Philadelphia by Goodrich for a new $500,000 brick and steel building which will house the district offices, central warehouse and a retail store. Scheduled for completion by next May, the new building will occupy approximately 100,000 square feet of floor space.

U. S. Rubber is installing new equipment at its Winnsboro, S. C., plant to double the production of Ustex, its high strength cotton yarn. The production of Ustex is again being concentrated on parachute harness webbing.

Committee D-21 on Wax Polishes and Related Materials has been organized by A.S.T.M. to develop standard test methods and definitions of terms and to promulgate standard specifications for these items. Water-emulsion type waxes will receive first consideration in the development of test methods.

Complete waterproof protection for babies is said to be provided in a new Velon plastic bunting manufactured by Gordon Film Plastics, Inc., of Akron, Ohio. The unit consists of a zipper-closed bag which covers the baby's body, and a hood with drawstring closure. It folds into purse size for convenient carrying.

Leaflets containing compounding information which will help suppliers to meet the specifications of the Westinghouse Electric Co. for products made of neoprene have been issued by DuPont. Ask for G Sheet No. 123.

An educational booklet on fire, suitable for distribution to fire protection personnel, is available from the Ansul Chemical Co., Marinette, Wisconsin. Called "Fundamentals of Fire Extinguishment," it is a 4-page illustrated discussion of what fire is, classes of fire, and proper methods of extinguishment.

A new employee insurance program, paid for entirely by the employer, has been adopted by the American Hard Rubber Co. It includes life, hospitalization and surgical insurance.

Brookfield Engineering Laboratories, Inc., Stoughton, Mass., has issued a brochure describing the Brookfield Synchro-lectric Viscometer. The instrument is used in the laboratory and at the point of process in a wide variety of industries to test, study and control viscosity.

The purchase of the Pyramid Products Co., of Chicago, manufacturers of wire stripping equipment, has been announced by Ideal Industries, Sycamore, Ill. Best known of the Pyramid line is the F-Z Wire Stripper, a small, hand-operated tool for quickly removing insulation from wire.

The Century Tire & Rubber Export Co., Mansfield, Ohio, has expanded its export service by establishing export headquarters at Akron. The new export headquarters, located at 9 South Main St., in Akron, is under the supervision of Vries Gravesteen as general manager.

Soft, roomy mittens for children coated with snow-and-water-resistant Vinylite resins have been introduced by the Plasticote Glove Co., Milwaukee, Wisconsin. Resistant to cracking and peeling, the coating remains flexible in cold weather and is also resistant to aging and discoloring.

A vibratory ball mill developed by the National Bureau of Standards rapidly and completely grinds cotton into particles a few microns in length with little or no oxidative change or contamination of the cellulose. It is expected to find application in the grinding and blending of a variety of substances, such as pigments, ceramic materials, resins, etc.

Miller Art Mfg. Co., New York, is currently featuring a new type of dress for little girls which has built-in panties lined with moisture-resistant Vinylite film. The dress is not pulled over the head, but is designed with snap fasteners down the front and along the sides of the built-in panties, so that the garment opens flat for simple dressing or undressing.

A proposed Simplified Practice Recommendation for Vinyl and Pyroxylin Coated Fabrics has been submitted to the industry by the Commodity Standards Division, Office of Industry and Commerce, Department of Commerce. Mimeographed copies of the recommendation can be secured by writing to the Division at Washington, D. C.

A new catalog section on its Plastikon rubber putty has been issued by Goodrich. The company recommends this material for many types of glazing and sealing and particularly where vibration, corrosion or moisture exists. Advantages, directions for use, and colors and grades are covered.

The Ohio State Federation of Labor is the latest labor organization to endorse the proposed Ohio River to Lake Erie conveyor belt. Previous endorsements of the "rubber railroad" were given by the Ohio Building and Construction Trades Council and the Ohio CIO organization.

Britain exported 300,000 more tires during the first half of the current year than in the first six months of 1949, which was then a record. The figures were 6,106,713 units and 5,770,225 units respectively.

Plastimat, a new type of table place mat made of Vinylite, is now being manufactured by the Hedwin Corp., 1525 West 41st St., Baltimore 11, Md.

Castor Oils, dehydrated castor oils and castor oil derivatives for use in industry are covered in a new booklet recently made available by the Baker Castor Oil Co., 120 Broadway, New York 5, N. Y.

An all-purpose utility bag, made of Vinylite, and suited for use as a laundry bag, for sewing and knitting, for shopping, etc., is now available from Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Calif.

Minnesota Mining & Manufacturing Co. has purchased the Big Rock Stone & Material Co. of Little Rock, Ark., to operate as a wholly-owned subsidiary of 3M.

Valuable papers are protected from soiling, tearing and unnecessary handling when encased in Vinylite plastic film envelopes produced by the Carson Glove Co., San Rafael, Calif.

The new Airfoam Pillow recently introduced by Goodyear is now being packaged in a five-color full-telescope carton made by American Coating Mills. The carton, which measures 24 by 16 by 5½ inches, serves both as a carrying container for the pillow and as display.

COLORFUL NEW SURFACE EFFECTS ARE ACHIEVED IN PLASTIC FILM

Colorful, three-dimensional surface and texture effects on Vinylite plastic film and sheeting, imparting a depth said to be totally new to plastics, were shown by the Bakelite Division of the Union Carbide and Carbon Corporation in a special preview held at the Hotel Delmonico in New York City on December 7.

The new surface effects combine the advantages of improved appearance, feel, styling and color, enhancing the acceptability of these materials for wider use in home decoration, fashion and allied fields. These economical new materials also possess all of the inherent qualities of Vinylite plastics, durability, ease of maintenance, resistance to fading, tearing, abrasion and scuffing. Mould and mildew do not affect them; they resist oils, grease, alcohol, most chemicals and are non-flammable.

Lightweight Sealtuft Shown

Featured in the showing were a new lightweight gauge line of Sealtuft, stitchless quilted plastic, made by Jason Corporation, Hoboken, N. J., and Coryl, a new formed Vinylite calendered film, produced by the Decora Corporation, Fort Edward, N. Y. The new materials of these two manufacturers as well as those of six other users of Vinylite plastics were employed throughout a complete home setting. The new textured materials were displayed in a living room, dinette, game room, bathroom, dressing room, bedroom, nursery, outdoor setting, cocktail corner and a decorator's studio.

Formed film, known as Coryl, processed from Vinylite plastic film by the Decora Corporation, has printing, color and texture on both sides of the film. The new embossing effect imparts a uniform thickness throughout the film. It improves the hand or feel as well as the tensile strength and resists wrinkling and creasing. One of the most important advantages of this new deep embossing development in formed film is elimination of curled edges, which was heretofore one of the greatest drawbacks to plastic draperies.

The new, lightweight gauge Sealtuft, produced from Vinylite plastic film by Jason Corporation, is designed to meet the increasing demands for this stitchless, quilted plastic. The lightweight material makes possible its application in new fields because of its beauty, thinner gauge and lower price. Some of the most important fields for application of this new Sealtuft are in home decoration—where lower price enables wider use—and in nursery products, because of easy maintenance and special designs for this purpose. The lightweight Sealtuft is available in five patterns, each in sixteen decorator colors.

Embossed Vinylite Sheeting

Deep embossed sheeting is produced from Vinylite plastic by Hedwin Corporation, Baltimore, Md., and Forrest Process and Development Corporation, New York City. Its deeper, three-dimensional appearance and durability makes it particularly suitable for place mats, handbags, wallets, belts, decorative applications for footwear, all of which are now on the retail market.

In announcing these new three-dimensional effects on Vinylite plastics, George C. Miller, Vice-President, Bakelite Division, said: "This showing is a preview of new developments for applying surface treatments to Vinylite plastics. Some of these materials have just been introduced to the trade and retail markets. Others are so very new they will not make their appearance on the market until the first part of next year.

"In our judgment another milestone has been reached in the growth and expansion of the plastic film and sheeting industry. This milestone marks the point at which Vinylite film and sheeting can be styled suitably and effectively for every room in the home, as well as for wider applications in the field of fashion. This accomplishment has been made possible through new methods of printing, embossing and forming.

"This specially-processed film and sheeting gives a particularly beautiful appearance that can duplicate with every excellent fidelity almost any fabric, pattern or weave. At the same time these new materials possess all of the inherent advantages of Vinylite plastics. Improved appearance is the keynote of these new three-dimensional materials. The depth of these textures and finishes eliminates the coldness of plastics, imparts a feel, and widens the latitude for color and design that was never before possible in plastics."

All recipients of questionnaires for the 1951 RUBBER RED BOOK are urged to return their completed forms as quickly as possible.

Step Up Malayan Campaign

A vigorous campaign designed to end the rebel menace in Malaya by the end of the current year has been launched by the British. One drastic decision calls for collective punishment. In the future when individuals engaged in communistic terrorism are found in a village or urban group the entire group will be held responsible and become liable to harsh penalties. Another sweeping anti-communist measure provides for the conscription of manpower, with a new director of manpower having authority to call up and assign individuals in the Malayan Federation to whatever jobs it is deemed they perform in the interest of rebel suppression. Still another move is the posting of an imposing list of rewards for communist leaders "dead or alive." Malay troops for use in the anti-communist campaign will be increased by at least two battalions. Malaya will also get some United States aid to build new roads, which will enable government authorities to take more effective security measures. ECA has earmarked $410,000 for a highway program in Malaya, covering the purchase of 20 American tractors and other road-building equipment.

Goodrich Plans $2,500,000 Plant

Plans for a new $2,500,000 industrial rubber products plant to be constructed near Marion, Ohio, have been announced by the B. F. Goodrich Co. When completed, the plant will employ approximately 300 persons. The structure will have 125,000 square feet of floor space. Goodrich now has manufacturing operations in 14 states. The new Marion plant will be the 12th in Ohio.

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CANADIAN NEWS

An injunction to prevent Thomas D. MacDonald, Canadian Combines Commissioner, from making a report to the Federal Government of results of investigations into an alleged rubber combine in Canada was refused by Mr. Justice W. F. Spence in a judgment handed down at Osgoode Hall in Toronto last month.

The rubber companies claimed they were entitled to an injunction as Mr. MacDonald was not the commissioner named in Section 27 of the Combines Investigation Act and not empowered to make the report to the Government. Requirements of the statute were met by Mr. MacDonald, his Lordship found, "so long as he himself comes to his own decision that a combine exists."

The investigation was authorized more than three years ago by Fred A. McGregor, who was then commissioner, and who resigned on January 1st, 1950. Ian M. MacKeigan, deputy commissioner who carried on the probe, also resigned a few weeks earlier. The statute provides that the person who believes there is a combine and conducts the investigation must make the report to the government.

The present commissioner reviewed the evidence his predecessor had taken, and in this way came to the conclusion of a possible rubber combine. He then caused an inquiry to be made in addition to the information already available to him, Mr. Justice Spence said, which brought him within the confines of the statute.

"True, however, the original determination that a combine might have existed was made by the defendant's (Mr. MacDonald's) predecessor. In my opinion, when he now asserts his intention of making a report to the Minister he is making a report on the investigation which he conducted," he said.

"There is no allegation of unfairness or breach of natural justice in the actions of the defendant. Therefore, I am not prepared to grant any injunction unless he is acting wholly without his jurisdiction."

The way is now cleared for Mr. MacDonald to present his brief on the investigation on the 20 companies involved to the Government. He conducted interviews with some of the company officials in September in Ottawa, asking them to make written submissions on the investigation.

The new $1,000,000 enlargement of the plant of the Dunlop Tire & Rubber Goods Co. in Toronto was officially "opened" last month with appropriate ceremonies. The enlargement is actually an L-shaped building built over and around the facilities at 870 Queen Street East in such a manner that it does not interfere with operations but rather expands such operations. Sir Clive Baillieu, chairman of the parent British company, presided at the ceremonies.

It is generally recognized that the enlarged facilities are only the first in a planned expansion program by Dunlop. It is an open secret that the company some years ago secured 55 acres at Whitby, Ont., for the purpose of constructing a plant to make Dunlopillo. It is possible that at some future date all Dunlopillo operations will be centered at Whitby, with the present facilities at Toronto diverted to other production.

The latest addition at Toronto is a two-story unit of structural steel and reinforced concrete. It has a frontage of 155 feet and extends 230 feet north. It adds 43,000 square feet of manufacturing space to the Toronto facilities.

According to officials at Ottawa, Canada will eventually have to follow the United States in restricting civilian uses of rubber. Passenger and truck tires will be the two civilian products most heavily hit.

The government will likely try to cut down on the civilian use without the imposition of direct controls, it was stated, but there is considerable doubt that it would be successful. Voluntary controls within the industry were tried at first in the case of steel and then rejected in favor of a full government-directed control and priority system.

There is no great shortage of rubber in Canada, although the price has been fluctuating because of panic buying and stockpiling by the U. S. Government on world rubber exchanges.

William Andrew Eden, former president of the Dominion Rubber Co., died recently in Knowlton, Quebec, at the age of 68. He was also a former vice-president of the Dominion Textile Co. and a former president of the Woods Manufacturing Co., Ltd. Born in Woodstock, Ont., Mr. Eden received his education in that city. In 1920 he became associated with Dominion Rubber. He was elected president in 1922, holding that position until 1939.

Polymer Corporation, Ltd., Sarnia, Ont., has raised prices of its synthetic rubbers in line with recently announced increases in the United States. General-purpose GR-S will henceforth be sold at 24.5c per pound, f.o.b. Sarnia, while the new price for butyl rubber is 20.75c per pound. The price of butyl rubber, originally 18.5c per pound, was advanced to 20.35c per pound last September. With the exception of the September increase in butyl, there had been no increase in Polymer's rubber prices since 1946.

Polymer's synthetic rubber facilities are currently being operated at peak capacity, around 60,000 tons a year. It is hoped that by the middle of next year plant expansion will permit a production boost of some 25%. Arrangements for additional feedstock supplies via the Sun Oil Company's new pipeline will permit the increase in production. It is also anticipated that still more feedstock supplies will be available sometime in 1952 when the Canadian Oil Co. completes its new Sarnia refinery.

Products of the industrial chemicals division and coating resins department of the plastics and resins division of the American Cyanamid Co. will be distributed throughout Canada in the future by North American Cyanamid, Ltd., a subsidiary. Sales offices for the units will be in Montreal and Toronto. The Canadian subsidiary has been distributing products of most of the divisions of the company for some time.

The Chemical Institute of Canada will hold its 34th annual conference in Winnipeg, June 18 to 20, 1951. Arrangements are well underway for a successful meeting and advance interest indicates this conference will be among the largest ever held by the Institute in Western Canada.

At technical sessions during the three-day conference, papers will be presented in agricultural chemistry and food technology, analytical chemistry, biological chemistry and nutrition, chemical education, chemical engineering, organic chemistry, physical chemistry, and protective coatings.

Outstanding scientists from Canada and the United States will address the conference which is expected to attract chemists and chemical engineers from all parts of Canada.

Canada, given sane government and peace, is in a favored position among nations when it comes to future growth, C. C. Thackeray, president, Dominion Rubber Company, Ltd., Montreal, said recently at a ceremony in which approximately 200 company employes were entertained at the annual 25-year-club banquet. Twenty received gold service pins for 25 years service, and five were awarded gold watches in recognition of 40 years service.

In discussing working conditions prevailing in Canada today, Mr. Thackeray said it was necessary to be "continually on the alert for methods and machines, as material prosperity has grown with productivity and productivity had been the result of the increased use of power and machines."

George D. Tilley has been appointed sales manager, mechanical rubber goods division, Quebec Division of Dominion Rubber Co. He succeeds A. C. McGiverin, who, in addition to being Quebec sales manager of the mechanical rubber goods division, was also director of government sales for all company products, and will now confine his activities to this latter capacity.

Mr. Tilley joined the company's mechanical rubber goods plant in Montreal in 1926 and was connected with the production and the industrial engineering departments. In 1941 he was transferred to the Quebec division sales department of which he became assistant sales manager in 1949.

NEW RUBBER GOODS

Sani-Base Flexible Baseboard

Cass Products Co., 5659 N. Lincoln Avenue, Chicago 45, Ill., have developed a new, all-purpose rubber flexible baseboard known as Sani-Base. This new product does all the jobs of quarter-round and other types of wood molding. Being made

of pure rubber, it is suited to installation around kitchen cabinets and in bathrooms. Sani-Base is quickly and easily applied with linoleum paste or rubber cement and can be fitted with equal ease to straight or curved wall and cabinet areas. The product is being produced in four colors—red, green, blue and yellow—and is available in 10 or 100-foot lengths.

Vibropad Shock Absorber Kit

A new self-engineered rubber pad kit that will eliminate up to 75 per cent of the vibration and shock caused by machinery has been introduced by the B. F. Goodrich Co., Akron, Ohio, as the answer to single problems of industrial vibration too small to justify the use of technical personnel. The Vibropad kit consists of a 12-inch square rubber pad, rubber tubes, thick washers and an instruction booklet. It was designed specifically to enable the small plant owner with only two or three machines to install the pads under the legs of the equipment and save the cost of engineering and installation. In addition to eliminating unnecessary wear and tear on the floor and building, Goodrich engineers said Vibropads also will reduce employee fatigue caused by noise.

Said to be the first systematic treatise on the science of designing mechanical equipment on the basis of detailed studies of human capabilities, the new handbook offered by the U. S. Department of Commerce is available at $5.00 per copy. Ask for PB 100-814, Handbook of Human Engineering for Design Engineers.

Plas-Stik Display Decals

A new display sticker that adheres to glass, and enameled, glossy, painted or metal surfaces, with no adhesive required to make it cling, has been introduced by the Decal Plas-Stik Co., New York, N. Y. Called Plas-Stik, the new product is a vinyl film cast from Geon paste resin, a product of the B. F. Goodrich Chemical Co., on which an advertiser's name, slogan or trade mark is printed in multi-colors by the silk screen process. It sticks to glass or other surfaces readily and can be removed, leaving no mark or stain. After removal, Plas-Stik may be used again.

Vinylite Television Chair

Plastictronics, Inc., 54 Green St., New York, N. Y., is manufacturing an inflatable, portable children's television seat made of vinylite. Combining the added advantages of comfort and space-saving, the seat is easily inflated orally or with a hand pump

and is designed with a suction feature that grabs the floor or carpet when the child is seated. When not in use, the "Video Chair" can be quickly deflated and folded into a small 8 by 10-inch package. The chair, when inflated, is 16 inches in diameter and 11 inches deep. The seats are available in a variety of colors and designs including rodeo, cowboy, Indian and circus figures.

Mattress Springs of Vinyl

Susquehanna Mills, Inc., 404 Fourth Avenue, New York, N. Y., has introduced a springless mattress core made of air-filled cubes of vinyl film. The finished twin-bed mattress weights approximately 35 pounds. The twin-size bed has 136 plastics cubes, individually sealed. In case of air leakage, single cubes can be replaced. According to the company, the mattress core survived 250,000 squeezes by a 250 pound roller. The mattress core will be on the market in mid-1951.

Plia-Pail Garbage Receptacle

An odorless, noiseless, animal-proof garbage pail made entirely of rubber and manufactured by the Goodyear Tire & Rubber Co. for the National Enamel & Stamping Co., Milwaukee 1, Wisc., was recently announced. Fitted with double handles, the light Plia-Pail is portable within the home or from the home to out-

side locations. Through a series of lips and slots, the lock-on lid fits snugly to the pail in pressure cooker fashion, sealing all odors within and also eliminating foraging by cats, dogs, rodents and insects. The pail will hold its shape indefinitely and will not chip or mar. It also may be cleaned with warm soap and water. The Plia-Pail is presently being redesigned by Raymond Loewy Associates with volume production scheduled to begin in March, 1951.

Alli-Gator Latex Puppet

Peter Puppet Playthings, 10-20 45th Rd., Long Island City, N. Y., is presently producing "Alli-Gator," a dragon-like puppet made of pure liquid latex. Designed by Raye Copeland, the puppet is 12 inches

long and fits the contours of the hand comfortably. Simple manual operation opens and closes the mouth and operates a built-in voice. Alli-Gator is presently available in three colors.

OBITUARIES

Charles M. White, Jr.

Charles M. White, Jr., retired rubber broker widely known in Akron rubber circles, and one-time employee of the Firestone Tire & Rubber Co., died at his birthplace in Warrenton, Va., on November 29. He was 62 years old. Mr. White was formerly in business with the late C. W. Seiberling, Jr. He left Akron about two years ago and moved back to Warrenton, where he had spent his youth. Mr. White was graduated from Randolph-Macon Academy in 1906 and from George Washington University in 1910 with a B. A. degree. Upon his graduation from college, he became associated with the Fauquier National Bank at Warrenton of which his father was president. In 1912, he came to Akron for instruction in the Sales Division of the Firestone Tire & Rubber Co. He spent the next two years in Syracuse, N. Y., as a member of the Firestone sales staff, and then was transferred to Detroit, Mich., where he spent the next six years. In 1920, Mr. White was transferred to Akron as sales manager for the Firestone Steel Products Co. Two years later he organized his own firm, White & Co., dealing in crude rubber and raw materials. Mr. White was a member of the Portage Country Club, the Akron City Club and the Fauquier Club of Warrenton. His daughter survives.

Wilfred E. Willis

Wilfred E. Willis, president of the E. J. Willis Co., and the Willis Marine Hardware Corp., both of New York City, was killed in an automobile collision on December 14 near Mobile, Ala. E. J. Willis Co. is a distributor of rubber marine supplies. Mr. Willis, 57 years old, was born in New York City and joined his father in business in 1923. A prominent figure in boat races, he was a member of the New York Athletic Club, the National Association of Engine and Boat Manufacturers, the Marine Trades Association, the Central Marine Chamber of Commerce and the Propeller Club of the United States. He was a founder of the National Sweepstakes Regatta and a former president of the Beacon Hill Golf Club in Atlantic Highlands, N. J. Mr. Willis is survived by his son and two daughters.

Anton Bamberger

Anton Bamberger, chairman of the board of the A. Bamberger Corp. and the American Molding Powder & Chemical Corp., both of Brooklyn, N. Y., died on December 28 in Kew Gardens General Hospital, Queens, N. Y., after a brief illness. He was 64 years old. Mr. Bamberger came to the United States from Germany in 1938 and established his plastics enterprises. He is survived by his wife, a son and a daughter.

John T. McLane

John Taggart McLane, president of the Sun Rubber Co. of Barberton, Ohio, died on December 9, at McKeesport Hospital, McKeesport, Penna., after a short illness. He was 72 years old. Born in West Point, Ohio, on July 17, 1878, Mr. McLane resided in Ohio until 1906 when he moved to Pennsylvania. In 1923, he and two associates, T. W. Smith, Jr., and Joseph L. McLane, a brother, founded Sun Rubber, said to be the nation's largest manufacturer of rubber toys and playthings. Mr. McLane was also the president of the McLane Real Estate Co. of McKeesport and the Fredericksburg Art Pottery Co. of Fredericksburg, Ohio. Mr. McLane was a member of B. P. O. E. No. 136 of McKeesport and F. N. A. M. Lodge No. 375 of Aliquippa, Penna. Funeral services were held at his home in Mt. Vernon, Penna., a suburb of McKeesport, on December 13 with interment at Versailles Cemetery in McKeesport. His wife and two daughters survive.

William Brown Bell

William Brown Bell, president of the American Cyanamid Co., New York, N. Y., died on December 20 in Marrakech, French Morocco, while on a pleasure and business trip through Europe and North Africa. He was 71 years old. Mr. Bell was born in Stroudsburg, Penna., and was graduated from Haverford College. He received his master's degree in political science at Columbia University in 1901 and his law degree in 1903. Mr. Bell became head of American Cyanamid in 1922. In 1934, he won the Chemical Industry's Medal for distinguished service to the industry. He served as chairman of the board and president of the Manufacturing Chemists Association and the Chemical Alliance. Widely known as a yachtsman, Mr. Bell was a director of the National Association of Manufacturers and at the time of his death was an honorary vice-president of that organization. He also was a director or officer of many national concerns. His widow and daughter survive.

William R. Prosser

William R. Prosser, sales representative for A. Schrader's Son Division of the Scovill Manufacturing Co., of Brooklyn, N. Y., died on December 19 at City Hospital in Akron, Ohio. He was 48 years old. Born in Helena, Mont., he had lived in Akron for 25 years. He was a member of the University Club, Fairlawn Country Club and the University of Michigan Alumni Club. Services were held on December 21 at the Billow Chapel in Akron, with interment in Rose Hill Burial Park. His widow, son and daughter survive.

Harry V. Snyder

Harry V. Snyder, factory manager of the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., died on December 2 at Point Pleasant Hospital, Point Pleasant, N. J. He was 56 years old. Mr. Snyder left high school in 1909 to join Manhattan, starting in the Billing Department, and continued his education evenings. As the company expanded, he became successively head of other departments including statistical and estimating, after which he was made manager of the tubing and sundries departments. For over 25 years he was manager of Manhattan's roll covering and tank lining departments. Mr. Snyder became assistant factory manager in 1942 and factory manager in September, 1948. During the early part of World War II, Mr. Snyder was in charge of materials procurement. His work is credited with being instrumental in winning four Army-Navy "E" Awards for Manhattan.

G. Walter Sanborn

G. Walter Sanborn, vice-president in charge of purchasing and traffic for the United Engineering and Foundry Co., Pittsburgh, Penna., died on December 15. Mr. Sanborn began his career with the William Tod Co. in Youngstown, Ohio, in 1902, and entered the employ of United Engineering in 1917 when the Tod company was merged with United Engineering. Mr. Sanborn attended Union Classical Institute, Schenectady, N. Y., and Colgate University in Hamilton, N. Y. He was recently made an honorary member of the Rotary Club of Pittsburgh and was also a member of the Duquesne Club, the Pittsburgh Athletic Association and the Masonic Order. Mr. Sanborn had been a member of the Purchasing Agents Association of Pittsburgh since its formation and had served as its president in 1921.

William Nicholas

William Nicholas, inventor and former vice-president of the Black Rock Manufacturing Co. of Bridgeport, Conn., died in that city on December 15. He was 89 years old. Mr. Nicholas once managed the Graphotype Co. in New York City. He was known for his inventions in connection with typesetting machinery. Mr. Nicholas is survived by his widow, son and three daughters.

Moses B. Salisbury

Moses B. Salisbury, retired president and chairman of the board of W. H. Salisbury & Co., Chicago 22, Ill., died in the Mercyville Sanitorium in Chicago on December 30. He was 70 years old. Mr. Salisbury was known as an inventor of electrical devices. His son, William H. Salisbury, secretary of W. H. Salisbury & Co., survives.

A plaque for industrial leadership was recently presented the B. F. Goodrich Co. at its Oaks, Penna., tire plant by the Philadelphia Chamber of Commerce.

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THE STORY BEHIND THE WORD...

KANGAROO...

When Captain Cook came to Queensland, Australia, in 1770, he was much intrigued by a strange hopping animal. Story has it that he asked a native what the name of this creature was. The native shrugged his shoulders and replied, "I don't understand you." Or as it sounded in his dialect, "Kangaroo". Cook thought this was the animal's name and thus it has been called.

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First name in Scrap Rubber.

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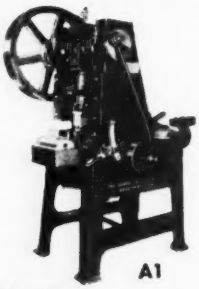
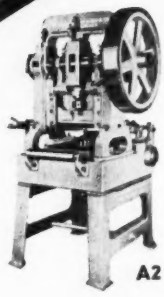
For MORE than Half a Century the name COULTER has meant MORE in higher quality cuttings . . . MORE IN GREATER PRODUCTION. So much MORE that . . .


A1

Men who Know PRODUCTION MACHINES Choose

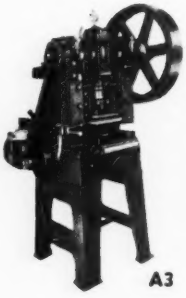
the James COULTER Machine Co.
BRIDGEPORT, CONN.

MODEL A-1
Cutting Heels at high speed production or short runs.


A2

MODEL A-2
Cutting Multiple Heels, Half and Full Soles with stock grain.

MODEL A-3
Cutting Multiple Heels and Taps with or across stock grain.


A3

MODEL A-2s
(Not illustrated)
Cutting across grain of stock.

COULTER PRODUCTION MACHINES SINCE 1896

NEW EQUIPMENT

Black Rock Guillotine Cutter

Applicable to the rubber, plastics and paperboard industries, the Guillotine Type Cut-Off Machine produced by the Black Rock Manufacturing Co., Bridgeport 5, Conn., is suited to the cutting of 48-inch wide sheet or slab stock. The new Model 4M-48, as it is called, will cut off stock up to 48 inches with thicknesses that may

go to 1¾ inches, depending on the type of tripping mechanism employed. The machine base is of steel weldment construction, supporting a heavy cast Meehanite cutting block with sufficient cross-section to support the cutting of thick, tough materials. A 5 h.p., 1200 r.p.m. motor drives a heavy cast flywheel which in turn drives the main shaft of the machine, operating the knife carriage. A one revolution clutch arrangement, operated through a solenoid trip mechanism, lends itself readily to various types of electrically-operated tripping devices, resulting in cuts ranging from ¼-inch up, depending on the type of trip mechanism and conveyor assembly used.

Taber Abraser Model 140

Sturdier shafts and larger ball bearings than were provided in previous models are incorporated in the Model 140 Abraser developed by the Taber Instruments Corp., 111-RA Goundry Street, North Tonawanda, N. Y. The new Taber Abraser incorporates the rotary rub-wear action of dual abrading wheels criss-crossing their abrasion path. The right wheel rubs the specimen from the center outward and the left wheel rubs the specimen from the outside in toward the center so that the abrasion lines cross each other like the letter "x". This action is continuous throughout the 360° rotation of the specimen and closely parallels abrasive action encountered in actual use.

The new abraser features a capacitor type motor with heavy duty worm-gear drive, an extra powerful vacuum unit with dual suction nozzle for high efficiency pickup of abradings, and an electric counter for registering the wear cycles. The two sets of stainless steel weights, in addition to the weight of the arm, provide three standard ranges of wheel pressures against the specimen, namely,

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For further details of Farrel-Birmingham mills, send for a copy of Bulletin 173. No cost or obligation.

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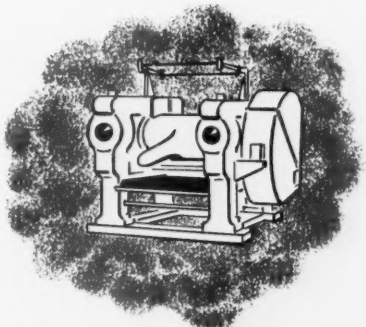
may not be special at all



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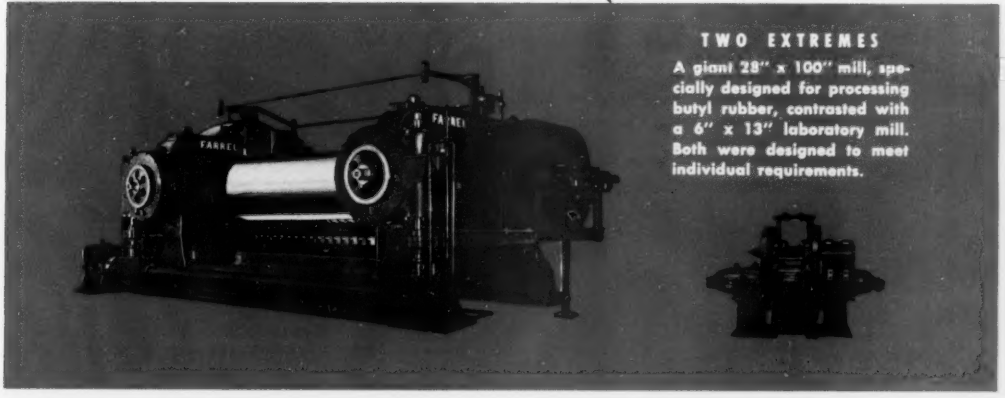

TWO EXTREMES

A giant 28" x 100" mill, specially designed for processing butyl rubber, contrasted with a 6" x 13" laboratory mill. Both were designed to meet individual requirements.

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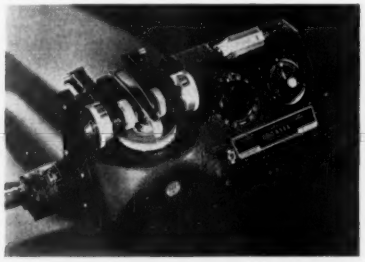
250, 500 and 1,000 grams. Provisions have been made for counterbalancing the weight of the abrading wheels when using the 250 grams load.

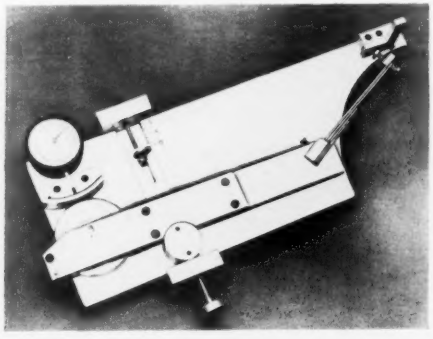
A variety of holders for different kinds of specimens have been developed, such as the rimmed specimen holder that can be partially filled with a liquid sufficient to wet the specimen or completely cover it while undergoing abrasion test. Rubber specimens may be tested in two ways, that is, sheet materials can be clamped or ap-



plied directly to the flat specimen holder. An alternate method is to transpose the abrading medium and the specimen by cutting or molding specimen material with wheels 2 inches in diameter by ½-inch thick and test them against the refacing stone, weighing the specimen before and after the test to determine the loss in weight from a predetermined amount of abrasion.

Dusenbery Knife Setting Gauge

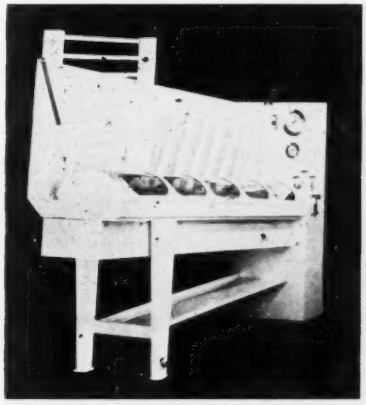
The Knife Setting Gauge manufactured by the John Dusenbery Co., Inc., 271 Grove Avenue, Verona, N. J., permits the use of knives varying in diameter up to ⅛-inch, and makes possible a complete spring tension adjustment before the knife levers are placed in the slitter. The gauge, which consists of a pressure anvil and dial



indicator, is set with the largest diameter knife to be used in the slitting set-up, and the pressure on all other knives can be adjusted in approximately 45 seconds per knife. The Dusenbery Knife Setting Gauge was designed in conjunction with the company's new line of chrome vanadium moly long-wearing slitter knives, but it is equally effective on all standard slitter set-ups. The dimensions of the unit are approximately 7¼ by 16½ by 1½ inches, and it weighs about 13 pounds.

Sprague Hose Test Machine

Faster inspection and full protection to the operator are features of the new air-operated, high-pressure hose testing machine now being manufactured by Sprague Engineering & Sales, 1144 West 135th St., Gardena, Calif. The unit provides for static testing of hose to any pressure up to 25,000 psi. The machine, Model



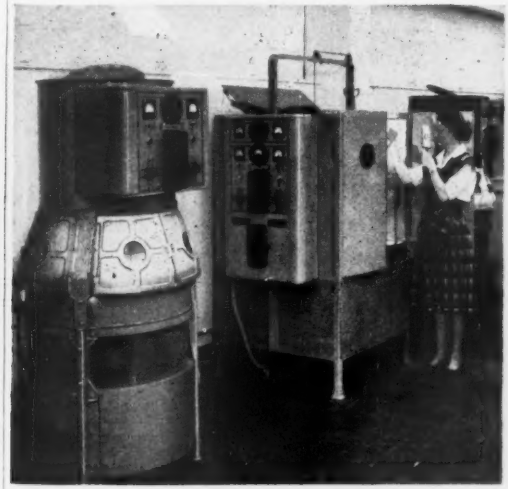
S-273, is completely self-contained and is furnished fully equipped with the necessary control valves, automatic quick release valve, automatic air bleed valves, micronic filter, instruments, etc., plus two Sprague air-operated, hydraulic boost pumps. One is for low pressures, 0 to 1,500 psi, and the other for high pressures, 0 to 25,000 psi. A deep sump, 10-feet long, with inclined drainboard, serves as the testing chamber. Visability and protection are provided by a steel framed Plexiglas cover which rolls away with finger tip control. A rack is furnished for draining hoses after testing.

Faster Processing?

SEE PAGE 390

ATLAS-OMETERS

. . used in Quality Control for plastic or rubber products at B. F. Goodrich Company



An important part of the tests at B. F. Goodrich Company Laboratories involves subjecting products to the destructive effects of weathering conditions they will be expected to meet in service. By using Atlas Fade-Ometers and Weather-Ometers it is often possible to obtain quickly, in advance of actual service, assurance that new materials will have satisfactory resistance to cracking, sun-checking, chalking, fading or bleeding of color, or to loss of elastic properties.

In the Fade-Ometer—used to check the reaction of any material or type of finish to the deteriorating effects of sunlight—plastic materials such as Koroseal are tested for permanence of bright color. The Weather-Ometer—which accurately duplicates rain, heavy dew, sunlight and thermal shock—offers complete control of these elements so that any desired climatic cycle can be obtained. Results of tests in the Weather-Ometer are used in the evaluation of the aging and weathering characteristics of rubbers and plastics under accelerated conditions corresponding to outdoor exposure.

The machines are easy to operate, fully automatic, and may safely be left in continuous operation overnight without attention from the operator.

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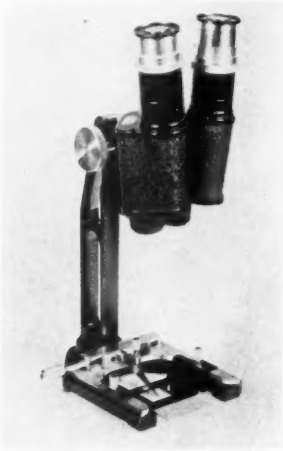
Standard of the World

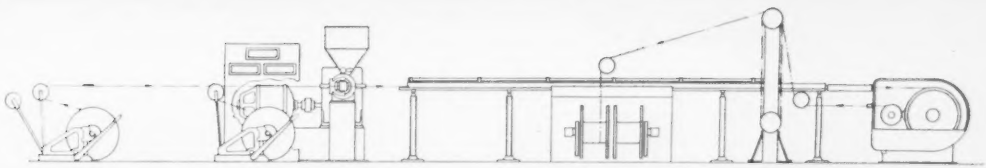
Scherr Wide-Field Binocular Microscope

Permitting examination of a comparatively large section in various magnifications, the Wide-Field Binocular Microscope manufactured by the George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y., has been placed upon the market with an attachment to simplify the counting of threads in fabrics. The microscope with the Oestermann Attachment is shown in the accompanying photograph. Three templets, ¼, ½ and 1 inch square, are furnished. In operation, a pointer or indicating finger attached to a precision slide with a screw is moved along the cloth from thread to thread. The image is fully erect, corresponding to the actual movement right or left, up or down. Two types of microscopes are available. The model A low power is furnished with 2 pairs of interchangeable eyepieces giving total magnifications of 4¼X and 6½X with fields of view 1.7 and 1.3 inches respectively. The focal distance is 8⅜ inches. One of the eyepieces is individually adjustable to take care of eyesight differences. The model B high power instrument has 3 pairs of eyepieces producing 10X, 20X and 30X magnifications for fine weaves and fields of view of 0.63, 0.43 and 0.32-inch, respectively. The focal distance is 3⅛ inches.



Designed for all types of materials, a new **Universal Moisture Tester** introduced by the Burrows Equipment Co., Evanston, Ill., gives direct moisture percentage readings on a dial from 8½ to 40%, instantly, without mathematical calculations or charts. Equipped with a built-in thermometer, the tester automatically indicates the temperature of the sample.

The Curtis Universal Joint Co., Springfield, Mass., has developed a new **ball-type universal joint.** The new joint is designed for light duty applications and is available in four sizes, from ½ to 1¼-inch, single or double, solid or bored hubs. It is said to feature ease of application, assembly and disassembly.



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Take for example the ATLAS Type "E" High Pressure Reducing Valve shown at the left, which is ideal for high pressure jobs in the rubber industries. This remarkable valve reduces pressures as high as 6,000 lb. per sq. in. *without shock*—air, water, or oil.

The list in the return coupon below gives the principal ATLAS products used in the rubber industries. Check the items on which you want complete data.

ATLAS has been in the regulating valve business for over a half century and positively GUARANTEES every product. In making Type "E", for example, we make the body of bar steel. Internal metal parts are specially protected. A formed packing of special material superior to leather is used which is immune to all fluids commonly used in hydraulic machinery. The pressure on the seat is balanced by a piston with the result that variations in high initial pressure have little effect on the reduced pressure. Complete data on request.

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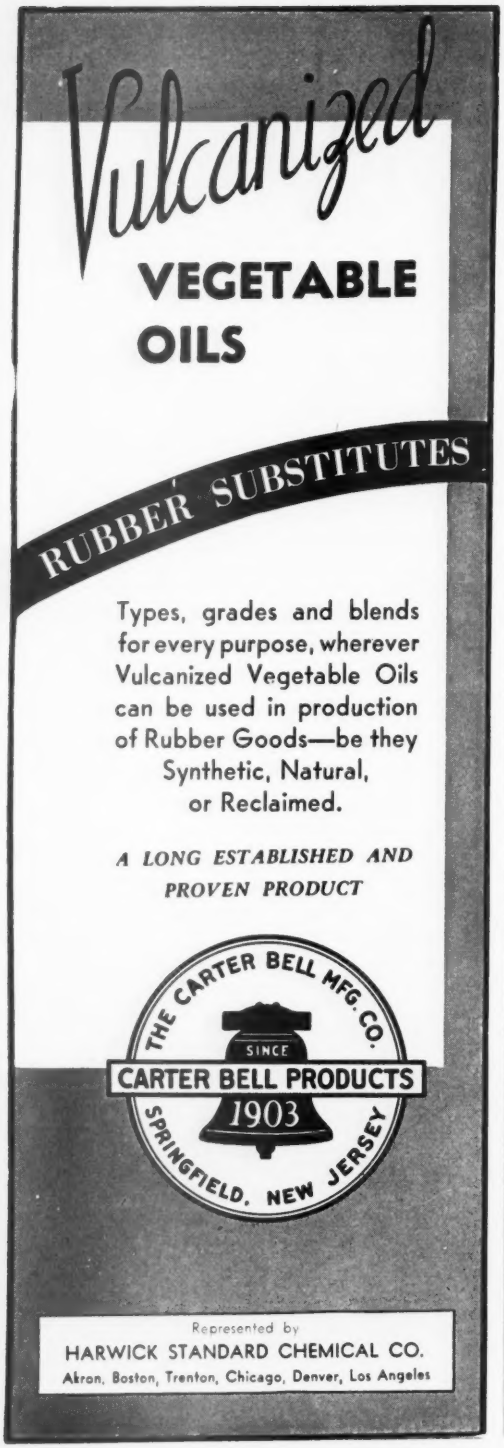
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REVIEWS

BOOKS

Natural and Synthetic High Polymers. (2nd Edition). By Kurt H. Meyer. Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 6½ x 9¼ in. 890 pp. $15.00.

The first edition of this book appeared in 1942 (see RUBBER AGE, Vol. 51, p. 546, Sept., 1942) as the fourth volume in the High Polymer Series being published by Interscience Publishers, Inc. It complemented the second volume in the series, namely "The Physical Chemistry of High Polymeric Systems" by Mark. Both volumes were actually translations of Meyer and Mark's "Der Aufbau der hochpolymeren organischen Naturstoffe," which was published some 20 years ago, and "Hochpolymere Chemie," which appeared about 10 years ago.

As explained by Meyer in his preface to the current work, the science of high polymers became a science in its own right during the 1930-40 period, and developed at an ever-increasing rate in the 1940-50 period. Accordingly, practically the whole book devoted to the natural and synthetic high polymers had to be rewritten, which accounts for this new edition, although the fundamental concept discussed in the first edition remains unchanged.

As in the first edition, sections are devoted to rubber and gutta-percha and to synthetic or chemical rubbers, with additional references to the rubberlike state appearing throughout the volume. It is interesting to note that the author has dropped quotation marks from the term synthetic as applied to rubber but now uses them around the term chemical as applied to rubber. Most of the data on rubber appears in the chapter on "High Polymeric Hydrocarbons and Their Derivatives."

Considerably larger than the first edition—890 pages as compared to 690 pages—the revised edition is divided into 11 sections, and includes extensive author and subject indexes.

•

Chemical Formulary. Vol. IX. Edited by H. Bennett. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 5½ x 8¼ in. 648 pp. $7.00.

(Available from Book Department, RUBBER AGE)

The latest edition of the "Chemical Formulary" follows in the footsteps of the previous eight volumes, listing the most up-to-date formulas and the most advanced methods which have been developed since the publication of Volume VIII. The policy of including formulas entirely different from those listed in the previous volumes of the series has been maintained, with special care exercised to avoid duplication. As usual, the introduction contains simple basic formulas and compounding methods which serve as a guide for beginners and students. The list of chemicals and their suppliers has been enlarged with new trade-mark chemicals, making it easy for the user to locate sources of supply. As in previous editions, the current work includes a number of formulas for rubber products, including hospital sheeting, sole stocks, nipple stocks, erasers, camelback, etc.

•

Standards on Textile Materials: 1950. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 584 pp. $4.50.

The current edition of this annual compilation includes in their latest form 90 specifications, test methods, and tolerances developed by A.S.T.M. Committee D-13 on Textile Materials. In addition to the standards, there are appendices covering basic properties of textile fibers, a psychrometric table for relative humidity, and a yarn number conversion table. Proposed methods of tests and practices for textile products are included, as are extensive sections giving photomicrographs of common textile fibers and of defects in woven fabrics. A convenient table of contents is also included (by subject and A.S.T.M. serial designation) and an index of methods of test.

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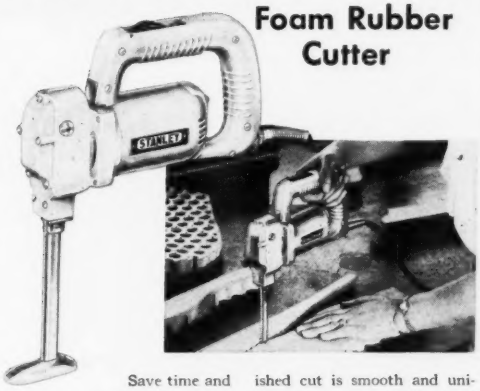

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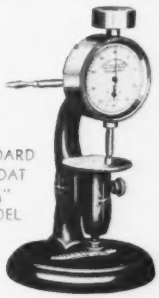

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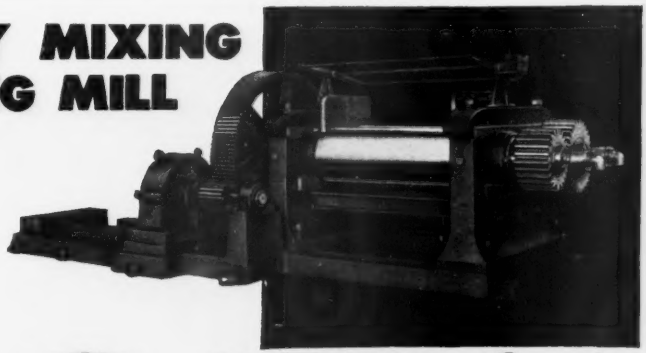

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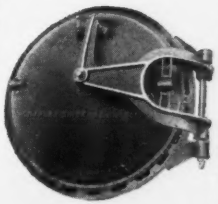

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"THE TRANSACTIONS I.R.I."

The following papers have been published in Vol. 26 Nos. 1-4 of the "Transactions I.R.I."

"Rubber as an Engineering Material." Symposium papers and discussions.
"Natural Rubber: Its Properties as a Raw Material for the Manufacturing Industry." A. van Rossem.
"The Weber Test for Natural Rubber." H. J. Stern.
"Continuous Vulcanisation Processes." W. H. Reece.
"Neoprene Compounding." H. J. Lanning.
"Carbon Black Manufacture in Great Britain." Fred H. Amon.
"Abrasion Resistance and its Measurement." J. M. Buist.
"Stability of Compounded Latex." K. W. Hayes.
"Determination of Copper in Rubber Latex." F. C. J. Poulton and M. E. Tunnicliffe.
"Oxidation of Natural Rubber Hydrocarbon." L. Bateman.
"Continuous Vulcanisation with reference to Flooring, Belting, etc." J. M. Bierer.
"Determining the Dynamic Coefficient of Friction of Vulcanised Rubber." A. Boonstra.
"Treatment of Abnormal Clonal Latices." E. W. Madge.
"Use of Statistical Methods in the Planning of Road Wear Tests." J. M. Buist, R. G. Newton and E. R. Thornley.

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REVIEWS (CONT'D)

Rubber Trade Directory of Great Britain: 1950. Published by Maclaren and Sons, Ltd., Stafford House, Norfolk St., London W.C. 2, England. 6 x 9½ in. 752 pp. £3 3s. 0d. ($9.00 in the United States and Canada).

(Available from Book Department, RUBBER AGE)

This is the first edition of a long-awaited and long-needed complete directory of the rubber industry of Great Britain. Patterned along the lines of the RUBBER RED BOOK, it is designed to fulfill both the requirements of the rubber manufacturer in his daily search for rubber chemicals and compounding ingredients, machinery and equipment, raw material supplies, etc., and the vast army of users of rubber products in all of their numerous shapes and forms. The publishers plan on issuing revised editions every other year.

Shaped to the special requirements of the British Rubber industry, the contents of the directory appears in English, French, German and Spanish. A comprehensive subject index at the back of the directory, covering 87 pages, is also repeated in the three foreign languages, with the English translation given after each entry. Since the British industry depends in large part on the export trade, this treatment considerably enhances the value of the work.

The edition is divided into 15 sections, as follows: (1) Rubber Manufacturers; (2) Rubber Machinery and Equipment; (3) Instrument and Laboratory Equipment; (4) Chemicals and Compounding Ingredients; (5) Fabrics and Textiles; (6) Components; (7) Natural Rubber and Latices; (8) Synthetic Rubbers, Latices and Kindred Materials; (9) Reclaimed Rubbers; (10) Scrap and Waste Rubber Merchants; (11) Manufacturers' Sundry Requirements; (12) Trade Marks and Brand Names; (13) Trade and Research Organizations; (14) Rubber Technology Schools and Courses; (15) Who's Who in the British Rubber Industry. In addition, appendices give data on overseas agents and offices and on consultants.

The first edition of this new biennial directory of the British rubber industry leaves little to be desired and the publishers will find improvement difficult. It is excellently printed on good white coated paper with divider strips setting off each section. Liberal use has been made of bold face type, with the result that listings stand out prominently. The publishers are to be congratulated for a difficult job well done.

•

Chemical Engineering Catalog: 1950-51. Published by the Reinhold Publishing Corp., 330 West 42nd St., New York 18, N. Y. 8¼ x 11 in. 1680 pp.

The latest edition of this "bible" of the chemical and process industries, the 35th annual edition to be issued, contains 1654 pages of product facts and technical data supplied by 466 leading manufacturers of processing, general engineering and manufacturing equipment. The traditional system of triple indexes is continued, i.e., alphabetically by company name, by trade name, and by type of equipment. A new functional approach to the classified index has, however, been incorporated for the first time. Now the user of the catalog can look over all headings which appear in the classified index which relate to 14 basic subjects. Among these subjects are heating and cooling, mixing, control, process development, materials and supplies, power, structures and safety. This new functional approach considerably enhances the growing value of the catalog.

•

Practical Microscopy. (2nd Edition). By L. C. Martin and B. K. Johnson. Printed in Great Britain. Available from the Chemical Publishing Co., 26 Court St., Brooklyn 2, N. Y. 5 x 7¼ in. 124 pp. $2.50.

Information necessary to apply the technique of modern microscopy in practice is presented in this informative little book. The optical principles and physical limitations of the microscope are discussed, but otherwise theory is kept to a minimum and the text is slanted toward the practical man and the student who use the microscope in their professional work and studies. Many practical hints are included on setting up the microscope correctly, preparation of specimens, various methods of mounting, etc. Numerous illustrations abet the text.

BOOKLETS, CATALOGS, etc.

Yeomans Pumps. Yeomans Brothers Co., 1455 North Dayton St., Chicago 22, Ill. 8½ x 11 in. 12 pp.

A full line of pumps for handling corrosive and non-corrosive liquids, solids-carrying liquids and dry and semi-dry materials is presented in this new condensed catalog. For easy use and reference the catalog is organized in sections: Corrosive and Non-Corrosive Liquids—with emphasis on vertical submerged centrifugal pumps and horizontal end-suction circulating pumps; Solids-Carrying Liquids—horizontal and vertical non-clog centrifugal pumps to handle solids, in various styles and different bearing constructions, and the Shone pneumatic unit—its application, operation and advantages; Dry and Semi-Dry Materials—the Yoemans "Transporter" for handling bulky materials with suggested applications and operation. The catalog is fully illustrated.

•

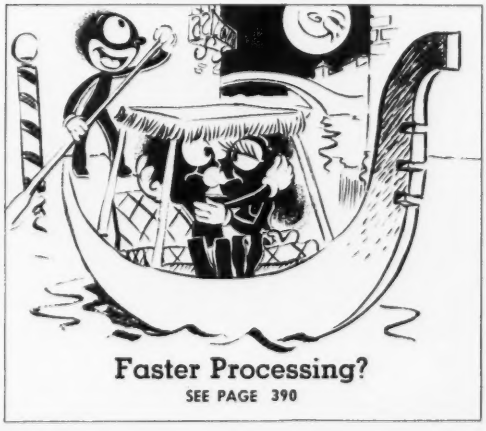
Fast Butyl Cures With Vulklor, G-M-F and Dibenzo G-M-F. (Compounding Research Report No. 14). Naugatuck Chemical Division, U. S. Rubber Co., Rockefeller Center, New York 20, N. Y. 8½ x 11 in. 20 pp.

This report describes the use of Naugatuck's dioximes, G-M-F and Dibenzo G-M-F, as vulcanizing agents in the production of butyl compounds highly resistant to severe aging conditions. It also introduces Vulklor, the company's new activator intended for use with G-M-F for ultra-fast cures at lower vulcanization costs. The rate of cure studies contained in this report are designed to illustrate ways of overcoming or greatly diminishing the usual difficulties which arise in conventional sulfur-accelerator butyl cures. The report is illustrated with many charts and graphs.

•

R-B-H Resin 510 in Adhesives and Coatings. R-B-H Dispersions, Division of Interchemical Corp., Bound Brook, N. J. 8½ x 11 in. 20 pp.

The general and physical properties of Resin 510, a low-molecular weight hydrocarbon resin, are described in this technical bulletin. The compatibility of the product with natural and synthetic rubbers, chlorinated and cyclized rubbers, waxes, vegetable and mineral oils, rosin, ester gum, 100% phenolic resins, modified phenolic resins, etc., is fully discussed. Various formulae are presented in which Resin 510 has been incorporated, particularly cements, adhesives and coatings. The bulletin is illustrated with many different charts and graphs.



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REVIEWS (CONT'D)

Eastern Fixed Mounting Mixers. (Bulletin No. 600). Eastern Industries, Inc., 296 Elm St., New Haven 6, Conn. 8½ x 11 in. 16 pp.

Complete engineering data on all Eastern top and side entering fixed-mounting mixers are contained in this bulletin. A discussion of the important factors which determine the choice of mixing equipment for a specific problem is presented. A section of the bulletin is devoted to engineering suggestions, and here comparisons are made between high and low speed mixers, single and dual propeller models, and vertical versus side entering mounting. The bulletin is illustrated with photographs and engineering drawings.

•

Microsen Temperature Indicators and Recorders. (Bulletin No. 404). Manning, Maxwell & Moore, Inc., Bridgeport 2, Conn. 8½ x 11 in. 12 pp.

The thermocouple actuated temperature indicating instruments manufactured by the company are described and illustrated in this bulletin. Specifications and ranges of the different instruments are presented and the design principles elaborated upon. A section of the booklet is devoted to a discussion of applications of the electric indicators and recorders. Descriptions of the different units are complete with engineering drawings. Much of the information presented is in tabular form.

•

Guide to Improved Packaging with Bakelite and Vinylite Plastics. Bakelite Division, Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 8 pp.

Outstanding applications of Bakelite and Vinylite are presented in this booklet. The advantages of using various forms of these materials in 21 different ways for packaging and display are cited. Properties of the specific form of Bakelite or Vinylite plastic or resins employed are listed with each application, and a photographic illustration shows one or more typical examples. The packaging applications are classified under such general headings as coatings, film and sheeting, and adhesives.

•

Silastic Facts. (No. 10). Dow Corning Corp., Midland, Mich. 8½ x 11 in. 16 pp.

The latest technical information available on Silastic, Dow Corning's silicone rubber, is presented in this booklet. This booklet supercedes "Silastic Facts—No. 5" and presents a comprehensive picture of the properties and performance of the Silastics. The usefulness of these semi-organic rubbery materials is indicated by a description of some typical applications for Silastic in a variety of industries.

Faster Processing?
SEE PAGE 390

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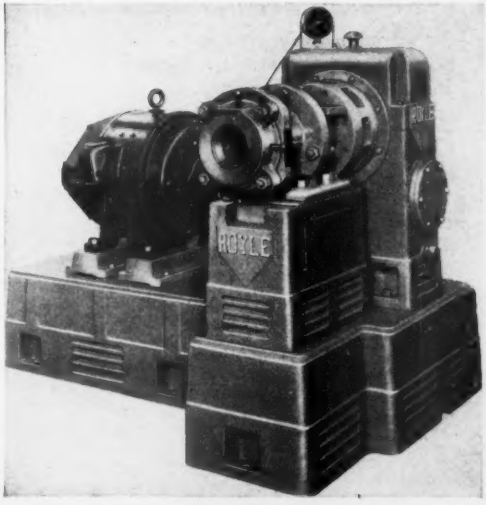

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PATERSON 3, NEW JERSEY

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, JAN. 9, 1951

Natural Rubber

The recent regulations over the purchase of natural rubber, as reported elsewhere in this issue, have brought rubber activities on the Commodity Exchange to a virtual standstill with most business concerning the liquidation of existing contracts. During the past period, the price of spot rubber moved in a range of 13.00 cents. The high for the period was reached on December 28 and again on December 29 with 79.00 cents, while the low for the period, 66.00 cents, was reached on January 3 and 4. The average price of spot rubber on the Exchange for the month of December was 71.20 cents based on 20 trading days. This compares with an average of 73.05 cents in November.

Until the Government clarifies some of the surrounding uncertainties, the rubber trade will necessarily adhere to a policy of extreme caution. Dealers and importers are still busy with previous commitments. Offerings of shipment rubber are being made to the Government and some business is taking place from day to day.

It has been calculated that the rubber in the Government stockpile amounts to approximately 600,000 tons. If this is reasonably correct, then the Government will contract for an additional 500,000 tons or more within the next 5 or 6 months including 300,000 tons for the stockpile. By the middle of 1951, stockpile on hand and purchased to arrive will approximate 1,000,000 tons.

Quotations for the outside market, shown below, represent estimates based upon the current situation. Quotations for the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.73
February	.72½
March	.67
Thin Latex Crepe:	
Spot	.75
February	.63½
Thin Brown Crepe, No. 2	.65
Ambers, No. 3	.70½
Flat Bark Crepe	.55

London Market

(Standard Smoked Sheets)

February	69.71 - 70.00
March	68.25 - 68.83

Singapore Market

(Standard Smoked Sheets)

February	65.04 - 65.37

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.465 - .475
Butaprene NL	.475 - .485
Butaprene NAA	.515 - .525
Butaprene NXM	.550 - .560
Chemigum 30 N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
GR-I	—— - .2075
GR-S	—— - .245
Hycar OR-25	.450 - .460
Hycar OR-15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Types CG and AC	—— - .500
Neoprene Type E	—— - .650
Neoprene Types FR and KNR	—— - .800
Neoprene Type GN	—— - .380
Neoprene Type GNA	—— - .380
Neoprene Type RT	—— - .400
Neoprene Type S	—— - .380
Neoprene Type W	—— - .400
Paracril 18	.430 - .450
Paracril 26	.440 - .460
Paracril 35	.510 - .530
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	.370 - .470
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850
Thiokol Type ST	.750 - .850

Scrap Rubber

Reclaimers are again actively in the market for scrap, thus improving the general tone of the scrap rubber market. This situation has reflected upon the price for scrap rubber which has been rising steadily during the past few weeks. However, as shortages of new rubber continue to mount, resulting in greater demands for reclaim, it is problematical if the scrap rubber market will attain any stability in the foreseeable future.

Mixed passenger tires	ton	$25.00
Beadless truck tires	ton	40.00
Mixed truck tires	ton	31.00
Beadless passenger tires	ton	32.00
No. 1 passenger peelings	ton	75.00
No. 1 truck peelings	ton	75.00
Red passenger tubes	lb.	.18
Black passenger tubes	lb.	.12
Mixed tubes	lb.	.12
No. 2 truck tubes	lb.	.18
Red truck tubes	lb.	.18
Black truck tubes	lb.	.12
Buffings	ton	35.00

Reclaimed Rubber

As a result of the shortages of new rubber, reclaimed rubber continues in extremely active demand, with the industry moving at peak levels. The industry believes that the long-term future for reclaim is assured as long as quality is unimpaired and prices remain attractive and is, therefore, making no sacrifices in quality to increase production still further. There has been no change in the price structure since our last report. Current quotations follow:

Tires

Black, Digester (Natural)	lb.	.10½ - .11
Peels No. 1	lb.	.11 - .11½
Whole Tire (Blend)	lb.	.10 - .10½

Inner Tubes

Black (Natural)	lb.	.24 - .25½
Red (Natural)	lb.	.28 - .28½
Butyl	lb.	.12½ - .13

Cotton Tire Fabrics

Few cotton tire fabric suppliers are offering quotations due to the extremely tight market situation. In view of increasing military demand for tires, mills see no lessening in the general situation in the next few months. As was the case in previous months, the industry is reported to be concentrating on 12/4/2 standard peelers. Prices reported below represent estimates on a more fluid market. Quotations follow:

Standard, Peeler, 12/4/2	lb.	.95
Extra Staple, Peeler, 12/4/2	lb.	1.00

Chafers

14.4 oz. (per sq. yard)	lb.	.86½
9.25 oz. (per sq. yard)	lb.	.83
11.65 oz. (per sq. yard)	lb.	.81
8.9 oz. (per sq. yard)	lb.	.83½

Cotton

The market for middling uplands on the Cotton Exchange has moved in a range of 2.23 cents since our last report (December 8), high for the period being 44.86 cents reached on January 9, and low being 42.63 cents reached on December 12. The average price of middling uplands for the month of December was 43.37 cents based on 23 trading days. This compares with an average of 43.11 cents in November.

A recent statement by the Department of Agriculture that it sees no reason for rationing cotton goods or raw cotton has had no apparent effect as a market factor. Market analysts point out that the statistical position is such that this view will probably be subject to review as the season progresses particularly if consumption holds at recent high levels. Military orders are heavy and some desired grades of raw cotton are expected to become scarce by spring.

According to reports reaching this country, the year 1950 marked the attainment by the Soviet Union of the highest level of industrial production in its history, substantially surpassing the goals of the 4th five year plan. It was estimated that the cotton harvest was more than 40% above 1940 levels, with cotton goods production showing a substantial increase.

Cotton acreage in the United States during 1951 is expected to total 24,641,000 acres compared with 18,654,000 acres planted in 1950, according to recent trade estimates. However, the shortage of labor, farm machinery, and a drought that extends over a large area west of the Mississippi casts a doubt over the ultimate production.

Quotations for middling uplands on the Exchange follow:

	Dec. 8	January 9		
	Close	High	Low	Close
March	41.80	43.84	43.63	43.77
May	41.22	43.50	43.26	43.34
July	40.77	43.00	42.80	42.90

Closing Rubber Prices on New York Commodity Exchange

(No. 1 R.S.S. Contract)

FROM DECEMBER 11 TO JANUARY 9

Dec.	Spot	Dec.	Mar.	May	July	Sales
11	67.00	63.25	51.25	46.50	43.00	48
12	67.00	65.00	51.00	45.05	42.75	43
13	67.00	65.00	50.50	46.00	43.50	28
14	68.00	68.00	52.25	47.00	45.00	14
15	69.00	70.50	53.50	49.50	46.00	20
16	——	——	——	——	——	——
17	——	——	——	——	——	——
18	72.00	73.00	55.50	51.00	47.00	514
19	72.00	73.00	54.00	50.00	46.50	78
20	72.00	73.00	54.00	50.00	47.00	27
21	73.00	76.00	54.00	51.00	48.00	10
22	75.00	76.00	55.00	52.00	50.50	6
23	——	——	——	——	——	——
24	——	——	——	——	——	——
25	——	——	——	——	——	——
26	78.00	80.00	57.00	53.50	52.25	10
27	79.00	85.00	60.25	55.50	53.50	51
28	79.00	——	64.25	59.00	57.00	56
29	79.00	——	61.50	55.50	53.00	49
30	——	——	——	——	——	——
31	——	——	——	——	——	——
Jan.						
1	——	——	——	——	——	——
2	68.00	——	60.50	56.50	53.00	20
3	66.00	——	56.50	51.50	49.00	8
4	66.00	——	55.00	51.00	47.00	1
5	67.00	——	59.00	53.75	50.00	3
6	——	——	——	——	——	——
7	——	——	——	——	——	——
8	73.00	——	63.00	57.75	54.00	11
9	75.00	——	67.00	61.75	57.95	3

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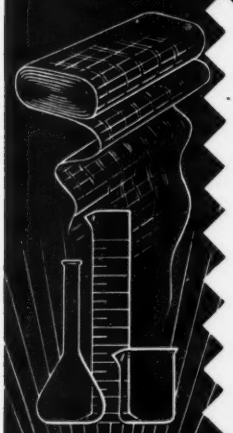

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS										RE-EXPORTS		TOTAL NET IMPORTS
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule						
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,640	125,373,864	14.08	11,944	4,168,127	15.58	2,508	628,886	11.19	412,092	5,652	1,799,124	406,440
1939	469,946	167,586,780	15.92	27,437*	10,467,552	17.03	2,233	461,345	9.27	499,616	13,125	5,832,618	486,491
1940	781,202	303,308,823	17.33	33,789	14,593,466	19.28	3,633*	758,007	9.31	818,624	7,060	3,197,136	811,564
1941	989,498	401,976,317	18.14	34,797*	15,963,627	20.48	4,881	1,145,767	10.48	1,029,176	5,376	2,757,872	1,023,800
1942	266,276	112,537,426	18.87	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,445	10,856	5,913,386	271,589
1943	50,358	31,369,198	27.81	1,890	1,312,202	31.00	7,678*	3,636,789	21.14	59,926	22,583	16,446,707	37,343
1944	103,847	73,908,549	31.77	3,091	2,092,211	30.99	6,701*	3,351,233	22.33	113,639	9,739	8,712,695	103,900
1945	134,408	93,814,102	31.82	4,733	3,115,853	30.22	10,040	5,963,797	26.52	149,221	9,509	7,201,746	139,712
1946	366,415	222,552,939	27.12	8,421	5,843,085	29.14	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1947	691,087	306,951,814	19.83	17,542	9,787,722	30.98	2,884	1,492,825	23.11	711,513	4,121	2,354,494	707,392
1948	702,293	290,849,177	18.49	32,745	9,820,080	24.93	302	71,330	10.53	735,340	6,672	3,259,124	728,668
1949	630,818	215,341,476	15.95	29,974	14,970,478	22.30	.....	.....	....	660,792	6,253	2,746,109	654,539
1949:													
Mar.	53,768	20,095,422	16.68	2,809	1,564,383	24.87	....	.....	....	56,577	562	245,780	56,015
Apr.	48,262	18,167,840	16.85	2,271	1,219,404	23.97	....	.....	....	50,533	315	165,632	50,218
May	51,243	18,827,018	16.40	2,191	1,105,887	22.54	....	.....	....	53,434	390	181,457	53,044
June	49,038	18,084,566	16.47	2,180	1,113,169	22.80	....	.....	....	51,218	471	226,882	50,747
July	43,474	15,502,688	15.76	2,267	1,146,784	22.59	....	.....	....	45,741	699	289,896	45,042
Aug.	46,853	15,828,526	15.08	2,725	1,342,109	21.98	....	.....	....	49,578	251	110,368	49,327
Sept.	43,476	14,909,331	14.45	2,144	1,095,225	22.81	.....	.....	....	45,620	556	248,921	45,064
Oct.	44,651	14,678,475	14.66	2,634	1,213,360	20.57	....	.....	....	47,285	404	160,047	46,881
Nov.	63,641	20,693,593	14.51	3,512	1,645,360	20.89	....	.....	....	67,153	11	9,002	67,142
Dec.	63,982	20,770,607	14.49	3,952	1,860,525	21.02	....	.....	....	67,394	689	295,362	67,245
1950:													
Jan.	54,277	17,881,882	14.71	3,974	1,951,793	21.92	....	.....	....	58,251	431	225,196	57,820
Feb.	50,022	17,373,658	15.51	3,336	1,608,163	21.52	....	.....	....	53,358	558	252,013	52,800
Mar.	57,831	21,120,732	16.30	3,650	1,826,747	22.34	....	.....	....	61,481	659	326,688	60,822
Apr.	72,418	27,412,444	16.89	4,395	2,199,149	22.34	175	47,117	12.02	76,988	639	340,781	76,349
May	56,804	21,822,118	17.15	3,183	1,904,513	26.71	200	58,948	13.16	60,187	597	289,551	59,590
June	73,806	31,525,162	19.07	3,965	2,294,158	25.83	105	33,651	14.31	77,876	625	322,008	76,451
July	53,245	27,256,854	20.11	4,225	2,710,430	28.64	70	26,836	17.11	57,540	683	381,650	56,857
Aug.	67,415	36,092,742	23.90	5,253	3,721,184	31.62	35	9,671	12.34	72,703	1,005	914,279	71,698
Sept.	55,981	36,724,072	29.23	5,117	4,369,707	38.12	55	15,148	12.34	61,153	879	798,935	60,274

Source: U. S. Department of Commerce. * Adjusted to agree with total gross imports.

Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule. (3) In the years 1940 through 1943, crepe sole rubber imports were reported under a separate classification. Such imports, which are included under natural rubber, dry above, were: 856,294 pounds, valued at $191,097 in 1940; 379,607 pounds, valued at $85,924 in 1941; 662,503 pounds, valued at $159,530 in 1942; and 21,653 pounds, valued at $5,215 in 1943.

Natural Rubber
(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	698,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1949:				
Mar.	56,577	53,108	562	117,664
Apr.	50,533	47,859	315	112,916
May	53,510	46,138	390	111,873
June	51,218	47,117	471	103,626
July	46,277	40,597	699	103,017
Aug.	49,579	45,307	251	99,850
Sept.	45,620	43,978	556	100,618
Oct.	47,285	51,243	404	90,733
Nov.	67,152	52,093	701	99,208
Dec.	67,934	52,919	713	106,619
1950:				
Jan.	58,251	59,992	431	108,769
Feb.	53,393	56,580	558	104,477
Mar.	61,481	60,859	639	101,691
Apr.	76,998	57,914	639	106,124
May	60,699	63,813	597	100,776
June	77,876	63,333	625	99,457
July	61,660	61,402	683	93,653
Aug.	72,973	64,297	1,005	87,146
Sept.	61,148	61,281	879	87,409
Oct.	78,351	67,868	564	82,036

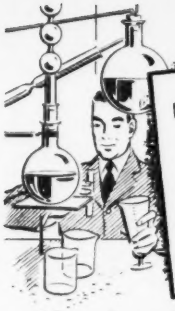
Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	330,296	804	525,763
1943	1,047	708,701	35	14,840	.....	.....
1944	1,012	660,805	86	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1949:						
Mar.	136	86,499	60	52,313	5	30,967
Apr.	88	48,244	14	8,753	16	9,878
May	103	60,361	85	83,291	..	.....
June	44	20,821	74	47,515	27	16,292
July	164	78,112	46	37,403	5	3,391
Aug.	137	66,002	114	96,509	5	2,218
Sept.	208	122,732	91	74,605	22	31,672
Oct.	222	142,538	123	92,681	19	15,221
Nov.	77	68,678	160	89,806	34	28,559
Dec.	54	36,980	108	67,002	39	24,061
1950:						
Jan.	61	42,855	37	18,308	56	35,288
Feb.	42	24,040	162	123,570	30	20,291
Mar.	90	66,374	113	97,008	17	13,672
Apr.	68	45,844	246	211,744	30	23,369
May	78	50,093	114	103,796	69	86,151
June	143	74,936	120	104,123	49	112,902
July	109	53,480	118	101,258	64	87,284
Aug.	171	102,985	234	200,912	46	41,790
Sept.	119	102,475	175	146,493	37	59,004

Source: U. S. Department of Commerce.



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Synthetic Rubber—Totals

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	114,963
1947	508,702	1,093	559,566	11,385	62,366
1948	488,343	15,671	442,072	4,874	115,111
1949	393,690	17,242	390,855	6,483	98,042
1950:					
Jan.	22,178	1,659	33,966	546	92,284
Feb.	29,336	2,033	31,860	577	88,381
Mar.	33,003	2,569	36,647	621	86,824
Apr.	34,821	2,302	38,075	711	83,440
May	37,320	2,762	43,366	620	74,524
June	38,569	2,433	46,011	622	65,346
July	43,820	2,239	43,687	707	67,085
Aug.	43,950	2,618	50,379	627	63,634
Sept.	44,460	1,947	49,550	629	59,059
Oct.	44,690	1,584	51,049	667	51,767

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795
1948	405,492	34,848	56,662	7,012	504,014
1949	310,599	35,215	54,046	11,072	410,932

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666
1948	345,313	32,118	58,870	5,771	442,072
1949	299,420	31,753	50,855	8,827	390,855

Exports

1942	222	1,037	..	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	797	72,697
1947	7,951	2,617	62	755	11,385
1948	1,093	2,875	21	885	4,874
1949	1,401	3,330	178	1,574	6,483

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	30,975	6,415	1,033	3,145	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,755	115,186
1947	40,606	5,237	13,184	3,339	62,366
1948	96,282	5,072	10,995	2,762	115,111
1949	77,731	4,654	12,224	3,433	98,042

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1943	1944	1945	1946	1947	1948	1949	1950
Jan.	36,085	47,540	52,008	51,746	57,057	61,308	63,083	66,908
Feb.	36,274	47,754	48,856	47,654	50,551	56,487	57,934	63,366
Mar.	41,586	52,263	55,364	56,703	59,947	68,171	73,118	78,739
Apr.	48,177	50,005	59,024	62,111	64,140	72,183	75,279	80,348
May	49,828	54,230	60,748	66,800	70,865	77,186	81,622	89,033
June	53,325	54,266	60,580	63,247	71,329	78,044	83,338	90,010
July	49,867	55,119	66,170	60,076	73,441	81,428	82,118	91,707
Aug.	51,880	55,618	70,058	66,729	72,089	80,351	84,632	94,537
Sept.	49,707	56,318	64,529	62,268	71,384	76,159	80,760	86,766
Oct.	53,111	53,154	55,708	66,637	73,277	75,164	79,253	88,961
Nov.	50,703	54,967	53,543	61,345	64,158	72,560	76,270	.....
Dec.	48,695	52,250	49,745	61,101	67,506	72,162	75,470	.....
Total	568,238	633,482	696,333	735,417	795,015	871,270	912,877	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption—Tons	Consumption—% to Crude *	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1949	224,029	226,679	22.5	10,637	28,263
1949:					
Sept.	18,304	18,517	24.2	761	26,257
Oct.	20,683	19,638	23.3	1,107	26,619
Nov.	19,382	18,512	22.1	796	27,801
Dec.	19,723	18,210	21.5	702	28,263
1950:					
Jan.	19,472	20,106	21.4	902	27,319
Feb.	20,474	19,741	22.2	790	27,256
Mar.	23,137	22,151	22.5	988	27,602
Apr.	22,716	21,318	22.2	982	28,352
May	24,879	24,158	21.9	881	27,837
June	25,960	25,253	22.7	889	28,470
July	24,347	23,377	22.2	864	30,371
Aug.	27,640	26,151	22.8	900	31,793
Sept.	29,749	29,250	26.4	1,177	33,395
Oct.	32,663	32,260	27.1	989	32,602

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986	1940	3,692,328	721,637	4,413,965
1931	1,973,090	416,648	2,389,738	1941	3,744,500	875,381	4,619,681
1932	1,135,491	235,187	1,370,678	1942	220,814	133,083	353,897
1933	1,573,512	346,545	1,920,057	1943	0	4,501	4,501
1934	2,177,919	575,192	2,753,111	1944	0	124,819	124,819
1935	3,252,244	694,690	3,946,934	1945	83,792	313,643	397,435
1936	3,669,528	781,862	4,451,390	1946	2,148,699	930,760	3,079,459
1937	3,915,889	892,382	4,808,271	1947	3,558,178	1,220,634	4,778,812
1938	2,000,985	485,852	2,486,837	1948	3,909,270	1,363,856	5,273,126
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1949:							
Jan.	326,019	104,599	430,618	July	483,261	95,348	578,609
Feb.	324,547	101,700	426,247	Aug.	557,370	99,850	657,220
Mar.	402,402	115,171	517,573	Sept.	534,493	91,389	625,882
Apr.	436,392	106,212	542,604	Oct.	487,891	84,704	572,595
May	394,703	86,200	480,903	Nov.	381,951	72,749	667,881
June	493,882	99,126	593,008	Dec.	285,930	66,688	352,618
1950:							
Jan.	487,824	93,323	581,147	July	595,067	111,028	706,095
Feb.	385,361	89,971	475,332	Aug.	682,782	134,853	817,635
Mar.	469,618	110,843	580,461	Sept.	616,827	105,562	722,389
Apr.	455,193	103,850	559,043	Oct.	651,169	108,815	723,984
May	575,518	120,963	696,481	Nov.	504,445	98,538	602,983
June	720,688	135,332	856,020	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1945	1946	1947	1948	1949
Passenger Car	4,504,368	15,058,469	21,346,004	23,842,796	27,715,344
Truck & Bus	6,386,652	5,939,244	7,737,353	6,920,231	4,238,174
Agricultural	1,441,909	1,735,992	2,633,699	3,140,882	2,695,430
Earth Mover	1,308	5,520	10,610	13,330	9,895
Total	12,434,237	22,739,225	31,727,666	33,917,239	34,658,843

	1950					
	June	July	Aug.	Sept.	Oct.	Nov.
Passenger Car	3,558,246	3,382,532	3,397,829	3,265,580	3,558,060	2,812,285
Truck & Bus	614,415	620,192	586,749	574,479	612,015	511,990
Agricultural	226,468	193,551	288,310	200,334	172,224	207,037
Earth Mover	2,967	1,041	1,576	2,134	1,798	911
Total	4,401,826	4,197,316	4,274,464	4,042,527	4,344,097	3,532,223

Source: The Tire & Rim Association, Inc.

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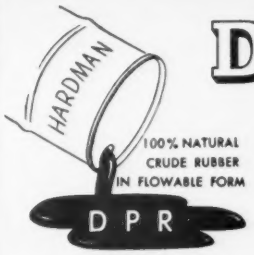

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PANAFLEX BN-1

EXCELLENT FOR *Light Colored* PRODUCTS!

PANAFLEX BN-1 is an economical, light-colored plasticizer for synthetic rubber — especially butadiene-acrylonitrile type.

This new hydrocarbon plasticizer *completely* replaces dibutyl phthalate in nitrile rubbers — produces soft vulcanizates having high tensile, excellent elongation, and very low modulus. **PANAFLEX BN-1** plasticized stocks possess good ageing properties, superior electrical characteristics, and show good gasoline and oil resistance.

SPECIFY GRAVITY	0.9440
COLOR, NPA	1½
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DISTILLATION, °F	560-730
ODOR	Excellent
VISCOSITY, SSU @ 100°F	240

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Pan American Refining Corp.

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PAN AMERICAN

Plant
Texas City, Texas

Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1938 (total)	**11,516**	**30,567**	**1,049**	**43,132**	**40,907**	**8,451**
Passenger Car	**10,086**	**27,104**	**580**	**37,770**	**35,789**	**6,937**
Truck and Bus	**1,430**	**3,463**	**469**	**5,362**	**5,118**	**1,514**
1939 (total)	**18,208**	**38,022**	**1,279**	**57,509**	**57,613**	**8,665**
Passenger Car	**15,742**	**33,471**	**607**	**49,820**	**49,933**	**7,108**
Truck and Bus	**2,466**	**4,551**	**672**	**7,689**	**7,680**	**1,557**
1940 (total)	**22,252**	**35,346**	**1,176**	**58,774**	**59,186**	**9,127**
Passenger Car	**19,560**	**30,903**	**411**	**50,874**	**50,965**	**7,270**
Truck and Bus	**2,692**	**4,443**	**765**	**7,900**	**8,221**	**1,857**
1941 (total)	**24,780**	**39,895**	**1,489**	**66,164**	**61,540**	**4,436**
Passenger Car	**19,855**	**34,119**	**586**	**54,560**	**50,392**	**3,165**
Truck and Bus	**4,925**	**5,776**	**903**	**11,604**	**11,148**	**1,271**
1942 (total)	**6,680**	**8,872**	**207**	**15,759**	**15,351**	**6,247**
Passenger Car	**910**	**2,734**	**38**	**3,682**	**2,790**	**4,432**
Truck and Bus	**5,770**	**6,138**	**169**	**12,077**	**12,561**	**1,815**
1943 (total)	**6,128**	**18,547**	**225**	**24,900**	**20,423**	**1,883**
Passenger Car	**82**	**10,606**	**71**	**10,759**	**7,620**	**1,132**
Truck and Bus	**6,046**	**7,941**	**154**	**14,141**	**12,803**	**751**
1944 (total)	**6,654**	**26,439**	**263**	**33,356**	**33,446**	**2,013**
Passenger Car	**208**	**18,330**	**130**	**18,668**	**18,819**	**1,218**
Truck and Bus	**6,446**	**8,109**	**133**	**14,688**	**14,627**	**795**
1945 (total)	**5,984**	**36,479**	**504**	**42,967**	**44,524**	**3,077**
Passenger Car	**1,115**	**25,463**	**222**	**26,800**	**28,200**	**2,214**
Truck and Bus	**4,869**	**11,016**	**282**	**16,167**	**16,324**	**863**
1946 (total)	**15,310**	**65,490**	**1,512**	**82,312**	**82,298**	**2,448**
Passenger Car	**11,086**	**54,684**	**653**	**66,423**	**66,466**	**1,763**
Truck and Bus	**4,224**	**10,806**	**859**	**15,889**	**15,832**	**685**
1947 (total)	**25,056**	**62,871**	**3,256**	**91,183**	**95,550**	**6,949**
Passenger Car	**19,644**	**52,847**	**1,608**	**74,109**	**77,795**	**5,444**
Truck and Bus	**5,412**	**10,014**	**1,648**	**17,074**	**17,755**	**1,505**
1948 (total)	**26,845**	**49,148**	**1,787**	**77,781**	**81,314**	**10,698**
Passenger Car	**21,589**	**41,295**	**656**	**63,540**	**66,738**	**8,773**
Truck and Bus	**5,256**	**7,853**	**1,132**	**14,241**	**14,576**	**1,925**
1949 (total)	31,584	43,466	1,467	76,517	76,369	10,638
Passenger Car	28,129	36,440	509	65,077	65,140	8,904
Truck and Bus	3,456	7,026	958	11,440	11,228	1,734
1950:						
June (total)	4,056	6,032	114	10,202	8,480	10,762
Passenger Car	3,605	5,131	48	8,804	7,311	8,987
Truck and Bus	450	882	66	1,398	1,169	1,775
July (total)	3,884	8,049	107	12,040	8,264	7,005
Passenger Car	3,470	6,899	53	10,422	7,103	5,690
Truck and Bus	414	1,150	54	1,619	1,160	1,314
Aug. (total)	4,093	6,399	117	10,610	8,173	4,801
Passenger Car	3,647	5,337	56	9,040	6,995	3,836
Truck and Bus	446	1,062	61	1,569	1,178	966
Sept. (total)	3,814	4,300	113	8,226	7,816	4,423
Passenger Car	3,415	3,512	48	6,975	6,621	3,497
Truck and Bus	399	788	64	1,251	1,195	926

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1947:							
Jan.-Mar.	**21,972**	**49,377**	**21,815**	**93,164**	**5,322**	**52,059**	**57,381**
Apr.-June	**23,491**	**53,746**	**16,480**	**93,717**	**5,486**	**47,360**	**52,846**
July-Sept.	**15,571**	**44,291**	**14,596**	**74,458**	**6,161**	**51,719**	**57,880**
Oct.-Dec.	**18,183**	**48,532**	**17,762**	**84,477**	**6,550**	**55,078**	**61,628**
Total	**79,217**	**195,946**	**70,653**	**345,816**	**23,519**	**206,216**	**229,735**
1948:							
Jan.-Mar.	**18,546**	**50,251**	**19,391**	**88,188**	**a**	**60,569**	**60,569**
Apr.-June	**15,585**	**45,385**	**18,213**	**79,183**	**a**	**59,759**	**59,759**
July-Sept.	29,743	45,927	*c*	75,670	*a*	63,642	63,642
Oct.-Dec.	13,321	34,424	15,879	63,624	*a*	65,258	65,258
Total	77,195	175,987	53,483	306,665	.....	249,228	249,228
1949:							
Jan.-Mar.	*d*	33,213	25,395	56,608	*a*	68,296	68,926
Apr.-June	5,309	29,114	13,617	48 040	*a*	68,269	68,269
July-Sept.	1,343	16,620	11,141	29,104	15,640	55,969	71,609
Oct.-Dec.	180	17,650	11,886	29,716	12,967	58,890	72,857
Total	6,832	96,597	62,039	163,468	28,607	251,424	281,661
1950:							
Jan.-Mar.	3,939	19,210	12,948	36,097	12,469	60,981	73,450
Apr.-June	11,077	29,498	14,071	54,646	11,510	59,966	71,476
July-Sept.	10,529	39,792	15,041	65,092	13,161	61,614	74,775
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. (c) Included with tire cord not woven. (d) Included with chafer and all other tire fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	6,895	7,213	159	14,267	12,685	6,206
1943	6,350	12,474	189	19,014	15,014	2,626
1944	6,460	20,569	196	27,224	27,488	2,813
1945	5,988	33,906	411	40,304	41,742	3,627
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,430	887	63,858	65,114	10,657
1950:						
Feb.	3,245	2,307	58	5,610	5,803	11,059
Mar.	2,831	2,842	61	5,733	6,223	11,432
Apr.	2,975	3,031	69	6,094	6,285	11,710
May	3,116	3,517	55	6,688	7,089	12,110
June	4,059	4,332	68	8,459	7,537	11,248
July	3,885	5,693	52	9,629	6,916	8,422
Aug.	4,095	5,048	66	9,209	7,244	6,619
Sept.	3,807	3,682	67	7,556	7,074	6,129

Source: The Rubber Manufacturers Association, Inc.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1931	8 5/8	4 1/4	6.17
1911	184	114	141.30	1932	4 1/4	2 1/2	3.49
1912	140	108	121.60	1933	9 7/8	2 7/8	5.96
1913	113	59	82.04	1934	15 7/8	8 3/4	12.92
1914	93	56	65.33	1935	13 3/4	10 1/2	12.37
1915	79	58 1/2	65.85	1936	23	13 1/2	16.41
1916	102	55	72.50	1937	26 7/8	14	19.39
1917	90	52	72.23	1938	17 7/8	10 3/4	14.64
1918	70	40	60.15	1939	24	14 1/8	17.57
1919	57	38 1/2	48.70	1940	24	18 3/4	20.10
1920	56 1/2	16	36.30	1941	24 7/8	19 1/2	22.40
1921	21 3/4	11 3/4	16.36	1942	22 1/2	22 1/2	22.50
1922	28 1/8	13 3/8	17.50	1943	22 1/2	22 1/2	22.50
1923	37 1/8	24 1/4	29.45	1944	22 1/2	22 1/2	22.50
1924	40 1/8	17 5/8	26.20	1945	22 1/2	22 1/2	22.50
1925	121	34 3/8	72.46	1946	22 1/2	22 1/2	22.50
1926	88 1/2	36 3/4	48.50	1947	25	14	20.00
1927	41 3/8	33	37.72	1948	25	18	21.99
1928	41 3/4	17	22.48	1949	19 3/4	15 5/8	17.57
1929	26 7/8	15 1/2	20.55	1950	86	18	41.10
1930	16 1/2	7 1/2	11.98				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1943	1944	1945	1946	1947	1948	1949	1950
Jan.	21.34	20.76	22.36	25.49	32.58	36.09	33.37	31.89
Feb.	21.61	21.34	22.29	26.57	33.91	33.63	33.41	32.79
Mar.	21.98	21.65	22.43	27.52	35.89	35.04	33.44	32.65
Apr.	22.02	21.71	21.88	28.40	35.89	38.10	33.84	33.23
May	21.97	21.63	23.30	28.17	36.51	38.57	33.73	33.64
June	21.92	23.31	23.42	29.89	37.83	38.12	33.56	34.61
July	21.46	22.33	23.27	34.11	38.03	34.89	32.99	38.11
Aug.	21.09	22.11	23.10	36.31	34.83	32.23	32.06	38.93
Sept.	21.10	22.10	23.25	37.59	32.21	31.92	30.94	41.62
Oct.	21.00	22.32	23.85	36.79	32.39	32.01	30.32	40.66
Nov.	20.32	22.13	24.71	31.50	34.50	32.15	30.52	43.11
Dec.	20.32	22.28	25.21	33.03	36.74	32.90	31.08	43.37
Average for Year	21.34	21.89	23.25	31.28	35.11	34.64	32.44	37.05

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [b]	All Other [b, c]
1946	52,080	11,673	61,852	27,083
1947	66,430	17,237	73,114	27,064
1948	**98,021**	**31,085**	**73,598**	**21,147**
1949	157,544	29,470	81,842	19,792
1950:				
May	18,692	3,539	9,998	1,648
June	16,740	3,330	9,569	1,506
July	18,868	3,646	8,722	1,688
Aug.	19,389	4,073	8,942	1,878
Sept.	18,498	3,682	9,309	1,832
Oct.	21,622	4,212	9,927	2,025

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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Advantages—

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★ Superior Heat Aging
★ Halts Natural Rubber Reversion
★ Safe Processing

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P. O. Box 339 Ridgewood, New Jersey

STEEL CALENDER STOCK SHELLS

ALL STEEL, ALL WELDED CONSTRUCTION, with forged steel hubs for 1¼", 1½" and 2" square bars.

4", 5", 6", 8", 10", 12", 15", 20" and 24" diameters. Any length.

Also Special Trucks (Leaf Type) Racks, Tables and Jigs.

Used in manufacturing rubber and plastic products.

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BRANCHES: CHICAGO, ILL. AKRON, O. DETROIT, MICH. LOS ANGELES, CAL.

Natural and Synthetic

Latex and Latex Compounds

for all purposes

Rubber Industry Employment, Wages and Hours

All Rubber Products

	1949				1950			
Mo.	Production Workers (thousands)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Production Workers (thousands)	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings
Jan.	201	$56.89	37.9	$1.501	187	$60.52	39.4	$1.536
Feb.	197	56.55	37.7	1.500	188	59.90	39.2	1.528
Mar.	194	55.43	37.0	1.498	189	59.70	39.3	1.519
Apr.	190	55.50	36.9	1.504	191	61.76	40.0	1.544
May	185	57.08	37.7	1.514	194	64.52	41.1	1.566
June	181	58.29	38.2	1.526	199	65.08	41.4	1.572
July	177	58.37	38.4	1.520	200	65.59	41.2	1.592
Aug.	180	57.72	38.3	1.507	209	66.89	42.2	1.585
Sept.	167	60.97	40.3	1.513	216	67.13	42.3	1.587
Oct.	187	59.57	39.4	1.512	220	....	..	....
Nov.	186	57.91	38.4	1.508	...	....	...	....
Dec.	187	59.04	39.2	1.506	...	....	..	....

Tires and Tubes

Jan.	91.3	60.72	35.3	1.720	82.6	67.70	38.4	1.763
Feb.	89.4	60.99	35.4	1.723	83.1	67.22	38.3	1.755
Mar.	88.6	61.50	35.8	1.718	83.4	65.26	37.4	1.745
Apr.	88.6	60.92	35.4	1.721	84.0	69.23	39.0	1.775
May	87.2	63.20	36.3	1.741	85.9	74.60	41.1	1.815
June	86.3	64.09	36.6	1.751	88.0	74.05	40.6	1.824
July	82.0	64.45	36.6	1.761	88.3	75.22	40.4	1.862
Aug.	80.9	62.32	36.0	1.731	90.2	77.27	41.5	1.862
Sept.	64.3	70.03	39.1	1.791	92.5	76.40	41.5	1.841
Oct.	81.1	64.83	37.3	1.738	...	....	...	....
Nov.	81.3	63.91	36.9	1.732	...	....	...	....
Dec.	82.1	64.79	37.3	1.737	...	....	...	....

Rubber Footwear

Jan.	24.8	51.86	40.2	1.290	20.1	45.87	35.7	1.285
Feb.	22.9	48.15	37.5	1.284	18.8	43.06	34.2	1.259
Mar.	21.9	42.07	33.6	1.252	19.4	51.04	40.0	1.276
Apr.	21.4	46.65	37.2	1.254	19.3	50.36	39.5	1.275
May	20.5	49.45	38.9	1.257	19.1	50.20	39.4	1.274
June	19.8	50.35	39.4	1.278	19.3	52.07	40.3	1.294
July	20.2	48.84	38.7	1.262	19.2	52.13	39.7	1.313
Aug.	20.3	48.78	38.9	1.254	20.7	54.27	42.3	1.283
Sept.	21.1	51.71	40.4	1.280	21.9	54.30	41.9	1.296
Oct.	21.5	49.81	39.1	1.274	...	....	...	....
Nov.	22.2	50.51	39.9	1.266	...	....	...	....
Dec.	22.1	50.23	39.8	1.262	...	....	...	....

All Other Rubber Products

Jan.	85.3	54.38	40.1	1.356	84.5	57.04	41.3	1.381
Feb.	85.1	54.05	40.1	1.348	86.3	56.43	41.1	1.373
Mar.	83.1	52.49	39.2	1.339	86.2	56.16	40.9	1.373
Apr.	79.6	51.69	38.4	1.346	87.2	57.13	41.1	1.390
May	77.2	52.51	39.1	1.343	88.8	57.92	41.7	1.389
June	75.3	53.85	39.8	1.353	92.0	59.23	42.4	1.397
July	74.5	54.11	40.2	1.346	92.8	59.08	42.2	1.400
Aug.	78.6	52.46	40.6	1.366	98.3	59.96	42.8	1.401
Sept.	81.4	56.28	41.2	1.366	101.4	61.42	43.1	1.425
Oct.	84.4	57.06	41.5	1.375	...	....	...	....
Nov.	82.8	54.04	39.5	1.368	...	....	...	....
Dec.	82.7	55.66	40.9	1.361	...	....	...	....

Source: U. S. Departments of Commerce and Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who worked during or received pay for the pay period ending nearest the 15th of the month. The employment series have been adjusted to levels indicated by Federal Security Agency data for 1947, and have been carried forward from 1947 bench-mark levels, thereby providing consistent series. Hours and earning data pertain only to production and related workers.

Production Index for the Rubber Industry

Production 1935-1939 = 100

(Based on man-hours)

	1948	1949	1950		1948	1949	1950
Jan.	223	193	194	July	200	175	222
Feb.	215	188	195	Aug.	207	178	238
Mar.	205	182	197	Sept.	205	174	248
Apr.	200	177	203	Oct.	205	192	255
May	201	178	213	Nov.	203	187	...
June	205	178	221	Dec.	200	193	...

Source: U. S. Department of Commerce.

Sales by the Rubber Industry

(In Millions of Dollars)

	1948	1949	1950		1948	1949	1950
Jan.	271	260	265	July	331	271	454
Feb.	265	251	273	Aug.	331	288	457
Mar.	270	260	293	Sept.	317	272	404
Apr.	285	257	288	Oct.	294	255	...
May	273	248	321	Nov.	291	247	...
June	299	266	350	Dec.	280	245	...

Source: U. S. Department of Commerce.

Rubber Manufacturers' Inventories

(Based upon Book-Value)

(In Millions of Dollars)

	1948	1949	1950		1948	1949	1950
Jan.	608	661	524	July	648	625	501
Feb.	625	661	526	Aug.	641	563	483
Mar.	634	653	532	Sept.	661	538	502
Apr.	625	648	536	Oct.	650	517	...
May	632	650	540	Nov.	667	526	...
June	645	644	544	Dec.	650	531	...

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1943	1944	1945	1946	1947	1948	1949
Antimony, Primary:							
Short tons	....	.....	.....	...	39	41	55
% of total	....	.....	.....	....	.002	.003	.005
Asphalt [a]							
Short tons	16,510	20,189	19,483	28,715	32,113	19,967	18,050
% of total	.005	.006	.005	.007	.007	.004	.003
Barite (Barytes):							
Short tons	8,000	10,000	10,000	20,000	17,000	18,000	14,000
% of total	3.9	2.9	2.1	4.4	3.1	2.85	2.53
Carbon Black:							
Short tons	236,737	369,015	402,193	470,732	471,790	435,282	383,565
% of total	90.3	94.6	95.5	95.3	94.3	95.5	93.5
Clay, Kaolin:							
Short tons	50,964	59,588	109,936	162,393	166,201	176,965	197,341
% of total	5.5	6.8	11.7	12.3	11.5	11.3	13.1
Clay, Fire & Stoneware:							
Short tons	10,259	7,160	7,800	12,951	17,970	15,480	.....
% of total	0.2	0.1	0.1	0.2	0.2	0.2	...
Lime:							
Short tons	2,039	5,634	7,170	3,193	589	1,154	.....
% of total	0.03	0.09	0.12	0.05	0.01	0.02	....
Litharge.							
Short tons	4,302	3,023	1,864	2,131	2,205	2,835	....
% of total	3.8	2.2	1.3	1.6	1.3	1.8	....
Lithopone:							
Short tons	1,078	726	977	1,607	3,085	4,192	3,245
% of total	0.8	0.5	0.7	1.1	1.9	3.0	4.1
Mica, Ground:							
Short tons	3,063	1,137	3,715	4,951	3,900	12,275	....
% of total	6.0	2.2	7.1	8.0	6.0	19.0	....
Sulfur:							
Short tons	51,000	63,000	64,960	72,800	72,800	70,560	59,360
% of total	1.8	1.9	2.0	2.2	1.8	1.7	1.5
Talc [b]							
Short tons	48,994	51,833	63,758*	65,980	71,840	66,226	53,414
% of total	11.8	13.0	16.0	14.4	13.9	13.0	.12
Zinc Oxide:							
Short tons	67,898	59,518	63,447	83,776	82,248	82,895	.....
% of total	47.4	42.3	49.6	53.1	51.2	54.9	.....

Source: U. S. Bureau of Mines.

Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. * Revised.

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